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OUTLINES

OF A

SYSTEM OF OBJECT-TEACHING,

PREPARED FOR

TEACHERS AND PARENTS.

BY

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WITH AN INTRODUCTION

BY

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INTRODUCTION.

WHAT is OBJECT-TEACHING? It is important to have a definite answer to this question; for something, under that name, is at work in the schools, differing much in phase, in aim, and results, according to circumstances, and yet always inviting comparison with other methods, and complacently putting on the air of admitted superiority.

Sometimes it seems to hold the office of a mere plaything. At all events, any tinge of training or instruction it may have, is exceedingly faint. Attention it attracts by an imposing array of heterogeneous objects, any one of which, from a flower to a fiddle-string, is made the ground of a set of questions more miscellaneous far than the motley group of articles, whence the selection has been made.

The questions being, as a general thing, the extemporaneous effusions of a brain bent on no higher purpose than that of carrying out some vague idea of making knowledge attractive, take, of course, the widest range and the loosest shape. No principle appears to be involved; and hence a curious assemblage of incongruous facts, or fancies, as the case may be, soon gather round the object in question, all of which, probably and most of which, certainly, the children, if left to themselves, would better collect from observation and experience.

What child, for example, old enough to attend school, requires to be told that air is good to breathe, water, to drink, that sugar is sweet and vinegar sour, that a calf, by the process of eating, grows to be a cow, that nails are made out of iron, and that our feet are used in walking and running, climbing and kicking? Yet, such is the superfluous work not seldom done, in schools and school books, under the specious name of object teaching. Shall it go hard with us then, if, in spite of the pains taken to invest this process with a show of superior adaptation to the wants of the school, we rank it, as an appliance in teaching, little above the commonplace contrivances of the nursery?

It is vain, in defense of a thing so fruitless, to appeal, as some have done, to the authority of Pestalozzi, affirming that "*observation* is the beginning of all knowledge." "Pestalozzi's System," as one rightly remarks, "was greatly better than his own exemplification of it." But the poorest exhibition of its powers and purposes ever made by himself, or by anybody else, able even dimly to perceive them, never left out the grand central idea—the attainment of clear notions through modes of observation, derivable from a just application of the laws of nature.

We say not that teaching answering to that we have instanced above, constitutes the *entirety* of what is delivered, for instruction, under this name. What we have cited, by way of illustration, comes, on the contrary, from the midst of a multitude of other things, far enough from being too obvious to need explanation, and rightly enough put among matters proper to be taught in schools, if only put in their proper places.

We say not, moreover, that many of these things might not, at times, be brought up with good effect, even out of their proper places, as *incidents*, in a course of instruction otherwise perfectly regular. In fact, they *are* so brought up, and not seldom, too, in the practice of every skillful and judicious teacher. But, in such cases, they serve the merely momentary purpose of arousing curiosity, awakening attention, relaxing effort, or, perhaps, giving vent to exuberant spirits in the form of a good, hearty laugh. All this is well. But, when these things pass certain limits, and, from being merely incidental and collateral, come to be made part of the main design, they are liable, we think, to the gravest objection.

Sometimes, however, the process takes a more rational shape. The aim of the examiner clearly is to enlarge the circle of the pupil's knowledge respecting the objects brought under inquiry, and not to amuse him merely with a recapitulation of his own ideas.

But, after all, he deals, and intends to deal, only with *isolated* facts. His hearers learn, doubtless, from day to day, what they knew not before ; and, if the process be long enough continued, they come at last to have a large amount of miscellaneous information. But what is it? *Rudis indigestaque moles.* A shapeless mass, confused, conglomerate, discordant, the necessary product of such a method.

If we look into the books on which, for the most part, this method relies for nutriment and guidance, we find them answerable exactly to the expectations they had raised. A world of facts lying half way between order and confusion ; yet better far than nothing at all, seeing that they are, even the poorest of them, free from the blunders that often and sadly deform the proceeding, when made a purely extemporaneous exercise. In this respect, indeed, the children have good reason to be grateful ; for, by the timely intervention of the books, they are not seldom saved, while being flooded with a multiplicity of facts, from being, at the same time, flooded with a multiplicity of errors.

Still this does not relieve the books from the fatal objection, lying against the method to which they minister. They mistake completely, in our view, the true end of scholastic education. They miss, in fact, the very mark they aim at, if they aim to impart knowledge rightly ; for they lack the essential element of order.

Another phase of object-teaching, current in some quarters, and entitled to higher rank as an educational force, is that which distinctly recognizes mental development as an essential, though subordinate *part* of the work it has to do. Its aim is, accordingly, two-fold. But its predominant purpose is to impart knowledge. All its lessons, whatever the objects, lean decidedly in that direction. So much is this the case, that intellectual training, as such, seems sometimes quite out of sight. Yet it re-appears at intervals, calling out, it may be, the mental forces, to mark the presence of sugar in maple-trees, and then affording exercise, in the way of classification, by leading them to the discovery of the same article in other things, differing as widely from each other as beets from grapes, or as milk from molasses. We accept this method for what it is worth ; but we count its worth, educationally, as not very great ; seeing that it wants unity of aim and steadiness of direction.

Yet another kind of object-teaching is that which looks upon the objects, employed in the process, merely or mainly as means of illustration. As things to be studied for their own sakes, and aside from the end immediately in view, they scarcely elicit a transient thought. Being merely *media*, they are, for that very reason, supposed to be sufficiently known.

Nor does the mind, as something to be brought under regular discipline, receive any greater attention. It may, and often *does*, get trained incidentally, as the objects may, and often *do*, get explained incidentally. But the paramount purpose is neither of these things, but to bring under vivid illustration something lying entirely beyond both.

It takes, for instance, a bundle of rods, as in the fable of the dying father and his sons, and shows how easy it is to snap them asunder when taken separately, how hard to do this while they are bound together. It turns with admiration to the teachings of our Lord, and thence learns to re-echo the call for attention to the lilies of the field, as far outvying in vesture the glory of Solomon, and so evincing the ever-watchful providence of God. Nay, in something of the spirit always inspired by the contemplation of that glorious example, it directs the wondering eye to the whole assemblage of things in visible nature, and, by skillful interrogation, realizes for us the truth intended by Job, when he exclaimed,—"*Speak to the earth and it will teach thee!*"

Object-teaching such as this, however, is far from being the handmaid of schools and colleges only. All venture its use ; but genius alone is equal to its highest and happiest exercise. In competent hands, humanity everywhere owns its magical influence. The untutored savage and the well-taught sage, allured alike by the spell of its power, receive with double delight the thought it conveys, because of the beauty that ushers its coming. For its objects, like sunbeams, reveal with unmistakable distinctness whatever they are commissioned to illustrate, and such is their multitude, such the variety of their forms, that Nature herself yields not more diversity. The tiniest flower and the sturdiest oak, the murmuring brook and the dashing torrent, the desert wild, the mountain steep, the crystal clear, the diamond bright—all, all come quick at its bidding, as at the touch of a magician's wand, and humbly offer the boundless resources of simile and metaphor at the shrine of all-creative imagination. But this style of teaching, great as is its power to attract and enlighten the mind, to stir the emotional nature, and give to beauty, sublimity, and grandeur the benefit of clear and elegant expression, would not be the most effective, were it even always attainable, for the patient, persevering work of the school-room.

The last kind of object-teaching here to be specified, is that which differs from all the rest, in having for its exclusive aim the training of the powers of the pupil. This is its dignity; this its peculiar distinction.

Whatever, in any of the rest, occupies the first place, takes here a position more or less subordinate, as a matter of course. For the main design here is development—development of the whole being; or, if confined in its operation to the narrower circle of scholastic education, development of the intellectual powers. On this it exhausts the teaching art, and, especially, the art of questioning.

He, therefore, that engages in object-teaching, under this view of its purpose, becomes at once, if at all fit for the place he assumes, what Socrates, in one of the Dialogues* of Plato, not unwittily styles himself "*an accoucheur of the mind.*" This is precisely his office ; and it presupposes a skillful practitioner. It implies a profound study of that system on which he is commissioned to operate. He must know something of mind, in a sense far higher than that in which the statuary is required to know something of marble. To spoil a statue is a thing of less consequence than to spoil a mind.

He has, in this undertaking, to adapt himself wisely to the nature of his materials—the varying talents, dispositions, and wants of his pupils. He must have an eye to what is most fit to ensure full harmonious development. He must mark, in each individual, the conditions of growth, which nature has imposed, and be wise to detect those subtle sources of hindrance, which so often effectually neutralize all his best endeavors.

In making use of objects, as the means of inducing thought, he must remember that he fails, and must fail, if he deals with the facts of nature as with a crowd of unrelated particulars. To make them proper instruments of training, they must come directly under that strong and steady light, which reveals the secret of scientific relationship. The laws that bind them together in the strong embrace of discovered truth, the affinities that open the way of ascent to general principles, making classification possible and reliable, must be brought distinctly under the eye of the observer, if we would make the facts observed minister rightly to true education.

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* Theætetus.

Such observation of facts and laws cannot but result in admirable discipline. The searching tests which it habitually applies to things, it no less habitually applies, though all unconsciously, to the mind itself. Begetting caution, as a constant characteristic, it saves us often from the ever-active tendency to deceive ourselves; while, from the very nature of the case, it gradually forms in us the habit of patient, laborious thinking. In this way, it becomes to us the medium of that which, more than anything else, marks indelibly and manifestly a well-disciplined mind—the power of forming *clear ideas*, and giving them *precise expression.*

The teacher endowed with the genuine spirit, will not be slow to take advantage of means so important. There is something here exactly suited to his hand. In the very secrecy of nature, he discerns the most efficient aids to his art. For Nature locks up, in synthetic forms, the manifold productions of her power, and loves to hide from vulgar view the elements engaged in their composition. To find a key to these mysterious combinations, and guide the opening faculties in the effort to take them apart, according to the ascertained law of their being, is the office of the teacher. In like spirit, and for like purpose, he employs the pupil in the work of reconstruction. That which is separated according to law, may again be united according to law; that is, analysis and synthesis must go hand in hand, the one illustrating the other, and both silently, but surely, combining their influence for the benefit of the mind engaged in applying them.

It has been doubted whether a method, aiming at such results, through such means, ought to bear such a name. For it is urged, and not altogether without reason, we think, that, if *this* be object-teaching, *all* teaching that follows the indications of nature, and the ascertained laws of mind, must equally be such. We can hardly carry on any course of instruction, it is added, under the light of these two guides, without forcing the faculties into vigorous exercise.

Even the author of the work to which these remarks are introductory, feels so forcibly the unfitness of the name, that he hesitates about using it, and mentions others, in his view, more appropriate.

But the *name* is nothing, so long as we make no mistake about the *thing*. And the thing is sufficiently distinguished by its purpose, which is EDUCATION—education bound fast to its primitive import; no mere accumulation of facts, which is *information*; nor yet a mere furnishing of the mind with knowledge, which is *instruction*.

Scientific attainment, indeed, though not its aim, is one of its necessary results. But attainment such as may fit one only for the exercise of a particular trade, calling, or profession, aside from the fitness that always comes of disciplined mind, is no necessary part of its object; for it comes to educate man, *as* man, to bring to his use resources not to be reached through the training that merely brings bread, though often giving even to *that* its best efficiency. It comes to cheer him with a sense of his real dignity, and to help him in the effort to climb a lofty eminence, "laborious indeed," as Milton has beautifully said, "at the first ascent, but else so smooth, so green, so full of goodly prospect and melodious sounds on every side, that the harp of Orpheus was not more charming."

The scheme of education indicated in the following pages, and carried out so far as the limits would allow, aims at a result no less elevated than this. We bespeak for it, therefore, an attentive, respectful hearing. It is a willing contribution to our present stock of educational forces, and we, accordingly, greet the contributor with a cordial welcome.

He comes, indeed, with the confidence that belongs to settled conviction, but with no pretentious air. His performance, therefore, is marked by no ambitious attempt to dazzle with a show of great originality. He is content seemingly to be useful rather than brilliant. For, having taken a wide survey of the field of education, and found there many willing workers, cheered by no adequate result, because unguided, or misguided in the use of means well-known to the few, he has brought for their benefit a convenient chart, engraven by experience on the clear ground of philosophy, and put it within the reach of every one. And, if there be merit in him who sets up a beacon to guide the helmsman in the darkness of night, what praise shall be accorded to him who, under like impulse, labors to throw light upon the path of those entrusted, not with the steerage of a ship, but with the education of immortal mind?

Let us, at least, give him the full assurance of a fair trial, so that he may safely turn over all unreasonable critics to the words of Pope:—

"Whoever thinks a faultless piece to see,
'Thinks what ne'er was, nor is, nor e'er shall be.
In every work regard the writer's end;
Since none can compass more than they intend;
And, if the means be just, the conduct true,
Applause, in spite of trivial faults, is due."

OBJECT TEACHING.

CHAPTER I.

HOW IDEAS ARE GAINED—ATTENTION—OBJECT OF EDUCATION—SCHOOL EDUCATION.

THE knowledge of the most trifling empirical fact, as well as of the greatest abstract truth, can reach our mind only through the senses, either directly or indirectly, with the assistance of memory and imagination—that great kaleidoscope of past experiences: *we learn by observation.* This fact is strikingly admitted by the great teacher of Christianity when he inculcates his sublime principles of religion and morality, either by illustration, appealing directly to the senses, or by parables, appealing to the imagination. It is indeed *proved by observation*—of the little child, seeing, touching, tasting, smelling, hearing—taking in the world around it through the senses, and discussing with its playmates the ideas gained.

Ideas are gained essentially in two ways. The human mind first perceives the impressions made upon it by external objects and phenomena through the various inlets of the soul—the senses, and forms them into clear and distinct ideas—*it observes facts;* it then compares these ideas, and classifies them, and unites them into more general, simpler ideas—*it observes the previously formed ideas.* The former process is generally termed *perception*, the latter, *reflection;* and, accordingly, we sometimes speak of *perceptive* and *reflective* faculties. There is evidently no intrinsic, subjective difference between the two faculties or sets of faculties, the difference is entirely an objective one: perceptive and reflective faculties, excluding memory and imagination, are the same faculties exercised upon different objects; dealing, in the one case, with *external facts*, and, in the other, with ideas—the results of previous operations of the mind—with *internal facts.* In the one case, the material upon which the mind works is offered by surrounding objects; in the other, this material is furnished by memory and imagination. It is obvious, then, that perception must always precede reflection; that simple perception, not needing the productive exercise of memory and imagination, is easier than reflection; and that the perceptive powers (holding fast the objective difference) can be educated with much less difficulty than the reflective powers, the exercise of which is based on clear and distinct perceptions, and which, on this account, may be considered of a higher order.

In both cases, observation is impossible without *attention,* and the ideas obtained through observation will be complete and accurate in proportion to the intensity and analytical power of attention in the respective individuals. Without attention the mind will remain unconscious of surrounding objects; increased attention will, circumstances being the same, increase the number, clearness, and accuracy of perceptions. Without attention, memory and imagination will remain inactive and will never unfold their inestimable treasures to the mind; increased attention will always increase the variety, distinctness, and truth of the reminiscences and images offered by these two untiring auxiliaries of reflection. Perhaps attention and activity of the mind are convertible terms: for we observe that the mind is never attentive, unless it is aroused to action, either by some external cause (such as a wonderful object, an exciting scene, a thrilling narrative, a deep sorrow), or by an internal cause—the will. But, however that may be, attention is certainly that state of the mind in which the latter *attends* to its work, and the *sine qua non* of all observation, of all acquisition of ideas.

Upon these considerations the system of Object-teaching is founded. The name, Object-teaching, indicates this but poorly, and it would be better for the success of the system in English schools if its German name, *Anschauungsunterricht* (intuition teaching), had been literally translated. On account of the simple, rational, and almost axiomatic nature of its principles, other names have been proposed, such as the *Natural Method* and the *Rational Method of Teaching*, both of which are more significant and comprehensive than the much abused and misunderstood name of Object-teaching. Yet a change of names would produce confusion and would therefore prove inexpedient. Hence, and hence alone, we shall adhere to the name already so generally adopted.

Education prepares man for his duties. Its object is to enable man to be useful and happy to the fullest extent. Usefulness and happiness require a harmonious, healthy, and vigorous exercise of all the faculties—mental, moral, and physical: hence education, in its complete sense, develops, cultivates, and directs all the faculties harmoniously, equally, naturally—and the teacher's main labor consists in so guiding the pupil's activity, that all his powers may ever keep pace with each other in their growth and that each may reach its full size without dwarfing the others.

Education may then be said to have a two-fold object: the *development* and *cultivation* of the faculties, enabling the pupil to form ideas and purposes; and the *direction* of these faculties, enabling the pupil to apply them for the purposes of usefulness and happiness. Both these objects should constantly be held in view in all teaching and should never be separated. Man must be taught not only to think, feel, and form plans; but also to speak, act, and execute with the necessary directness, energy, and power of endurance.

Unfortunately, however, the present condition of society does not permit the school to carry this out fully; false social principles have robbed the teacher of nearly all control over the physical and over a great portion of the moral nature of his pupils, and compel him to direct his efforts almost exclusively to intellectual education. We are, then, justified in stating that the principal aim of school education is to teach the pupils *how to form ideas* and *how to express them.* The amount and kind of knowledge gained are only secondary considerations, important ones, indeed, but considerations that will take care of themselves, if the power to form and express ideas has been properly imparted. A person who has this double power—who knows how to observe and how to apply the results of his observations—will derive so much pleasure and profit from it, that he will not be satisfied unless he is constantly increasing his stock of information; and, in all relations of life, he will soon know everything that it is necessary and possible for him to know, and, at the same time, be able to make it useful to himself and others. This is the "knowledge which is most worth;" this, and this alone, the "knowledge which is power." Without this knowledge, learning is useless—a rotting carcass, conspicuous only by the ill odor of its decomposition; without this knowledge, skill is unavailing—an engine without a moving and directing power. We would not be understood to mean that the systematic "laying up" of positive information is not a duty of the school, a duty, too, in the discharge of which much care and discrimination are needed; but simply that it is of secondary importance. The former is the ability to work, the latter the result of the work; the former labors, the latter rewards; the former is an essential, the latter a consequence: the former is constant, the same at all times and under all circumstances, the latter must change with time and circumstances.

The first duty of the school, then, must be to develop and cultivate the power of forming and expressing ideas; its second duty, to make a judicious selection of subjects of study—to direct the pupil's attention to such sources of positive information as may prove most useful to him and to society —to induce him to practice the acquired power upon the material that may yield the richest harvest of available ideas ; its first duty is to find the best method; its second, to determine the most expedient course of study. Now, while courses of study may vary indefinitely, there can be but one *best* method of teaching the formation and expression of ideas, just as there can be but one mode of forming and expressing ideas completely and accurately — and the system of Object-teaching claims to follow that method.

CHAPTER II.

PRINCIPLES OF OBJECT TEACHING — ORDER IN WHICH THE FACULTIES ARE DEVELOPED—ORDER OF METHOD —SYNTHESIS AND ANALYSIS—INDEPENDENT ACTIVITY.

THE principles of Object-teaching may be classed under the following three heads:

1. *Cultivate the faculties in their natural order of development*—PERCEPTION, CONCEPTION, JUDGMENT.

2. *Proceed from the known to the unknown—from the simple to the complex—from the concrete to the abstract—from the whole to the parts—from the particular to the general.*

3. *Accustom the child to activity. Never* TELL *the child what it can* DISCOVER; *never do for the child what* IT *can do.*

Although these principles must present themselves as axioms to the mind of every intelligent observer of human nature, it may be well to insist upon their importance and comprehensiveness in a somewhat more impressive manner than their sinple statement.

First, then, *cultivate the faculties in their natural order of development.* Nature places before the child an innumerable variety of *objects,* differing indefinitely in their qualities and undergoing countless changes. These make impressions on the child's mind through the various *senses,* vague at first, but gradually increasing in distinctness and clearness, as the mind is more and more aroused to *attention* by that very variety, and becomes more and more skilled in discrimination (analytical power). The child first forms *perceptions,* notions of external things and changes through the senses; and these perceptions, other circumstances being equal, are clear *in proportion to the variety of impressions made upon the senses.* For this variety is the principal agent in arousing and maintaining the child's attention, without which perception becomes impossible. The care bestowed upon this fundamental function of the mind cannot be too great—indeed, nature never relaxes it, even with the matured mind—for it is obvious that all other mental and, we add, moral functions—the whole vigor and scope of mind and heart—depend upon the clearness, accuracy, and number of our perceptions.

As the number of perceptions increases, many of them are presented repeatedly. The child greets them as old acquaintances and, looking upon all with cheerful attention, begins to find a pleasure in engraving them all upon the memory, so that in leisure hours it may muse upon them and imagine that those same objects and phenomena are again present. And thus, with the assistance of memory and imagination, it forms *conceptions, ideas,* the vividness and correctness of which depend on the vividness and correctness of previous perceptions as well as upon the respective powers of memory and imagination. The child should be encouraged in these moments of musing during which two essential functions of the mind grow. Thoughtless teachers and parents often cut them short, reproaching the child with listlessness and laziness, not dreaming that they are stunting the mind in its development.

Soon the conceptions thus formed become so numerous, that the child finds it difficult to retain them all and begins to feel the necessity of abbreviations, as it were. It then re-examines objects and phenomena more minutely, and discovers in them many points of resemblance, trifling ones at first, but gradually more important ones. A new and interesting field is opened to the activity of the mind; objects are compared again and again, arranged and re-arranged into sets or classes; then these sets are similarly compared and arranged, until a certain order begins to take the place of the previous confusion and the motley and unwieldy heap of independent conceptions is reduced to a harmonious, simple system of more or less general ideas, satisfying the youth's mind according to the ease with which conceptions of new objects or phenomena may be brought into the system. The mind is here developing its highest power—*the power of comparing and generalizing;* and this power once fully developed, the possessor of the mind is prepared for the duties of life—capable of being a useful and happy man or woman, at least as far as the mind is concerned.

This is the course of nature in the mental development, and this also must be the course of the object teacher, the teacher who follows the *natural* system. First he must train the senses, so that they may convey impressions rapidly, correctly, fully; and the mind, so that it may change these impressions readily into correct and full PERCEPTIONS—so that it may always understand and direct the senses. Then he must give full opportunity for the development of a quick, unerring memory, and of a healthy, vivid imagination, in order to insure the formation of accurate, vivid CONCEPTIONS; and, lastly, he must guide his pupils in the difficult task to make correct, careful, exhaustive comparison, and of complete, simple generalizations—must secure sound, quick, independent JUDGMENT. And these things he must do *slowly*, never allowing the child to be surfeited—*gradually*, never training a higher function until the development of the preceding one admits it—and *constantly*, never permitting any of the faculties to remain stationary, or even to lose power and skill by disuse.

The second principle: Proceed from the *known to the unknown—from the simple to the complex—from the concrete to the abstract—from the whole to the parts—from the particular to the general*, needs little comment. It is necessary, however, to remove an apparent contradiction in the principle, where it requires the teacher to proceed from the whole to the parts, on the one hand, and from the particular to the general, on the other. The former has reference to objects and phenomena, the latter to ideas; the former is based upon the fact that the observation of an object or phenomen~~a~~on as a whole, attending only to its most prominent characteristics, is less difficult than the minute observation of its parts—the latter is based upon the fact that comparison and generalization, the highest functions of the mind, are founded upon a knowledge of particulars. In this connection, we would direct attention to a question concerning which there exists little clearness and certainty, and, consequently, much difference of opnion in the minds of teachers; the question, whether synthesis or analysis should precede. Some, perhaps the majority, maintain that synthesis should come first; others argue, at least very plausibly, that analysis should take the lead. In attempting to find the truth concerning this important point, it is necessary, in the first place, to have a clear idea of the nature of the two methods. In analysis we decompose, separate an object of observation into its component parts. We start with the object as a whole and resolve it into its constituent elements. In synthesis we work in the opposite direction; from a number of given objects we form a new one, (more or less complex than the former.)(?) Thus, if we should see a knife, for the first time, we would first examine it as a whole, in order to form some general idea of its appearance; we would then successively pass to the handle, the blades, the springs, the rivets, and at last to the parts of the handle, the blade, &c., until we should be satisfactorily informed about all the details that may interest us in the knife. This would be analysis. We might then have given to us the various parts of another knife, similar to the one observed, and, with the necessary tools and skill, we might go to work to put them together and form a new knife; or we might go still further, and, taking steel, iron, and wood, manufacture the parts of another knife and put them together; or, supposing that the knife observed had been a table-knife, we might combine the information gained by its observation with previous observations upon other objects, and *invent* a pocket-knife. This would be synthesis. It is obvious, then, that analysis furnishes the material which synthesis applies. Analysis discovers, synthesis imitates, creates, and invents; the former sows, the latter reaps. Through analysis the world impresses us, through synthesis we impress the world. Analysis without subsequent synthesis is useless; synthesis without previous analysis is impossible. Synthesis is the way of the manufacturer, the artist, the instructor (not synonymous with teacher); analysis that of the purchaser, the connoisseur, the student. Analysis perceives, conceives, compares; synthesis generalizes. From these considerations, it appears that the two methods are mutually dependent upon each other; that, instead of being opposed to each other as two *different* methods to accomplish the same end, "they are only the necessary parts of the *same* method"—the *method of intellectual life.*

Let us now observe the manner in which Nature reveals herself to her children—the manner in which she teaches her pupils. We find that she surrounds them with an apparently arbitrary collection of motley objects and phenomena—a promiscuous pile of matter in various states of rest and motion—endless, indeed, but equally endless in extent and confusion. We notice also that the things which she offers at any one time to the senses of the learner, are "fixed facts," *results* of her activity; that she seems to make diligent efforts, as it were, to conceal from the observer her manner of producing these results—her synthesis. Observing the intellectual development of a child from its birth, we find that it is first aroused to a consciousness of the existence of surrounding things by their motions and sounds. A few days after birth, it begins already to follow with evident pleasure objects in their motions, to notice brother and sister playing about the room, to watch the motion of the mother's busy hand plying the needle, of the father's foot, swinging contentedly while he sits reading in the easy chair; or to listen with delight to the striking of the clock, the ticking of the watch, or the canary's joyous song. The *rolling* ball, the *blazing* fire, the *barking* dog, the *noisy* rattle have fettered the child's attention long before it deigns to look upon the beautiful paintings that embellish the walls, or the bright carpet that adorns the floor of the room. Thus it will soon have surrounded itself with a little world of *moving* and *sounding* objects which it delights to observe. In the mean while, brother has so often rolled the ball for it and sister has so often shaken the rattle in its face, that it begins to stretch out its little hands for these playthings and attempts to roll and shake them itself. Notice the delight with which it greets success: *it has succeeded in its first synthesis—it has proved the correctness of its first analysis.* The thing and its motion, the ball and its rolling were at first but one impression on the little mind; repeated observations, then, enabled it (having noticed the ball alternately at rest and in motion) to distinguish the object at rest from the same object in motion—to analyze, as it were, the *ball* away from the *rolling ball.* These two impressions needed only a third, the pushing of the ball by the brother's hand, to enable the child to *apply* the knowledge gained—to take the ball at rest, push it with its own hand, and convert it into a ball in motion. And, thus, if we follow the child as it goes on enriching its store of experiences, we find that the same method is invariably used, viz., *analysis is succeeded by corresponding synthesis, discovery is succeeded by immediate application, experiences fixed by immediate and repeated practice.* We notice the child successively analyzing away from the object, impressions of color, weight, hardness, roughness, shape, number, &c., and fixing them in the mind as separate ideas, by means of repeated application, repeated synthesis. In the beginning, this is only the synthesis of imitation, its results resemble the objects observed; but in the course of time, the child will learn to combine and apply experiences, so as to obtain entirely new and complex results—will learn to practice the synthesis of invention. And this we shall find to be the method of all independent intellectual activity, even in mature age. To this method we owe all our knowledge, and all our beautiful applications of the laws of nature, of the relations of numbers—all, indeed, that we know and can do. The teacher, then, who would teach naturally, must follow this method, and guide his pupils, *first in clear, rapid analysis, then in repeated, interesting synthesis—first the synthesis of imitation, then that of invention.*

It appears, then, that those object-teachers who have given us the principle, "First synthesis, then analysis," with the rather plausible addition, "not the order of the subject, but the order of nature," did not appreciate very clearly the meaning of the terms they used. In this inference we are confirmed by the fact that the practical directions and illustrations which they give in their works, proceed upon an entirely different principle, viz., the one indicated above. We are led to believe that they mistook the terms *synthesis* and *analysis*, respectively, for *induction* and *deduction*, terms which apply only to judgment. If so, the *meaning* of the principle is correct, as far as it goes, and it coincides with that portion of our second principle which requires the teacher to go from the particular to the general. Every one, however, will perceive that the basis of all induction is a series of careful analysis; that deduction is not truly analysis, but a mere singling out of an object of observation from a number of similar ones, proved similar by induction; and that, consequently, the *statement* of the principle is faulty and insufficient.

The third principle—ACCUSTOM THE CHILD TO ACTIVITY; NEVER TELL THE CHILD WHAT IT CAN DISCOVER; NEVER DO FOR THE CHILD WHAT IT CAN DO—seems, if possible, still plainer than the two preceding ones, but, unfortunately, is the most generally neglected. Yet the teacher has only to follow nature, to encourage the natural disposition of the pupil, in order to follow this principle. The child, man indeed, is naturally active in every respect, anxious to exercise, and thereby strengthen all his powers; and this desire for activity increases with the increasing power, until a certain standard of maturity is reached. There are no persons *naturally* lazy or indolent—they are only *made so by false education.* Natural education never produces such results—and *every system of education is so far faulty as it saves the pupil wholesome labor, and as it has a* *tendency to satiate more than to excite to greater activity.* These faults Object-teaching would try to avoid, so that it may send pupils from school hungry for more and with sufficient power, energy, and endurance to obtain more—pupils who feel that their education can never be finished and who have the ability to continue it independently, not pupils who are glad to have escaped the odious school-house and to have "finished their education."

If the first two principles refer principally to the receptive, internal powers of the child, the third, *Accustom the child to activity,* has special reference to the expressive powers of the child. If the first two principles guide us in teaching the child how to think, feel, and form purposes, the third guides us in teaching it how to say, do, and execute. If the first two principles teach us how to *develop* and *cultivate* the faculties, the third teaches us how to *direct* those faculties, so as to enable the pupil to enjoy usefulness and happiness.

CHAPTER III.

SCOPE OF OBJECT-TEACHING—OBJECT LESSONS — SCOPE OF THIS WORK—REQUISITES IN THE TEACHER.

From these considerations, it appears that Object-teaching is not a mere subject of instruction—is not, as some would make it, synonymous with Object Lessons, or Lessons on Common Things, but that its scope is as extensive as education. It embraces all subjects of study: teaching in all its phases, to become efficient, must adapt itself to the requirements of this system. Its material is the universe in all its extent and variety. Its application leads the pupil gradually but surely from a consideration of form and size to the science of geometry—from number to arithmetic and algebra—from minerals plants, and animals to mineralogy, botany, and zoölogy—from physical, chemical, and physiological phenomena to physics, chemistry, and physiology—from language to grammar, and so on through all the arts and sciences. Object Lessons, which the Germans call more appropriately *Denk und Sprech-Uebungen* (exercises in thinking and speaking), remain within the pale of the system and form a part of it, so long as they do not degenerate into Lessons on Common Things. But these Lessons on Common Things, far from being synonymous even with Object Lessons, are entirely opposed and foreign to the system—the result of that miserable hankering for the double-quick, cramming process, so peculiar to our English schools.

The introduction of the system of Object-teaching does not introduce *new courses of study*, but only a *new method of teaching the established courses*—a method claiming to follow more logical principles. The purpose of its discoverers and expounders, from Socrates down to Pestalozzi and his followers, was not and is not to innovate, but to improve—not to confuse, but to regulate, to simplify. Teachers, in all times, as far as they were truly successful, have followed the principles of this system; but, not following them consistently and thoroughly, they were only partially successful.

To show how the system will enable them to be wholly successful, is the aim for which this little book was written. It would require volumes to accomplish this fully and in detail with every subject of study; a full *exposé* of even one subject would lead us into many tedious minutiæ, and would lay the book open to the danger of being used as a text-book by incompetent or indolent teachers. We are content, therefore, to merely *indicate* the application of its principles in a few typical subjects of study: *Grammar*, *Geometry*, and *Natural History*. Of course, we do not mean to give full information concerning these subjects; we do not intend to write an exhaustive didactic treatise on grammar, geometry, and natural history, but we would merely show, by means of a few practical illustrations and hints, how these subjects may be handled in obedience to the principles of the system. Also we do not mean to imply that the system of Object-teaching is applicable to these branches alone, but we have selected them merely because its principles can be most clearly and completely illustrated with them. At the same time, we shall limit ourselves in the first subject, principally to the construction of language; in the second, to elementary geometry; in the third, to botany and zoology.

Before we proceed to these illustrations, it may be useful to indicate, in a general way, a few requisites on the part of the teacher, without which he could never have success in this method. These remarks may be trite; but the little attention paid by a number of teachers to the requisites discussed in them, justifies us in repeating them here.

In the first place, the teacher must feel and appreciate the whole nature, importance, and scope of the responsibility which his *profession* imposes on him. The schoolmaster who is not fully impressed with the vast influence which he exerts by example and word upon his pupils; the youngster who merely uses this profession as a stepping-stone to some other calling, which he, in his selfish narrow-mindedness, considers higher, because more lucrative; the person who embraces the trade of school-keeper for the want of capital to become a shop-keeper; the stripling who by selfish and unprincipled friends is put on the rostrum for the purpose of "finishing" his own "education" at the expense of the young, budding minds of a whole village; the veteran "dealer in boys and birch, who considers the boys, from whom he gathers his harvest, as so much corn which must be threshed and knocked about the ears" before a grain of sense can be extracted; the pedant who considers himself a vast show-house of knowledge, where the astonished and delighted urchins come to stare and wonder—never can deserve the name of teacher.

In the next place, the teacher must be patient, allowing no obstacle to cause him to recede, no failure to discourage him. Especially should he reject the idea that "there must be *some blockheads* in every class." For no child, that is not an idiot, is a *block-*

head. They may sleep in his mind and soul, all those sublime faculties, and they may sleep a deep, nay, death-like sleep; but it is the teacher's duty to awake them and to cultivate them with fostering care and unremitting patience, like tender, precious plants just sprung from their seeds—not to neglect them and set those blockheads aside as incorrigible; for by this he loads upon himself a heavy sin against the person whom he has left to ignorance and contempt, and bereaved of mental and moral enjoyment, against society whom he has robbed of a valuable coadjutor in the cause of civilization. The true teacher must know the state of advancement of each of his pupils, and, although arranged in classes, each pupil must receive instruction adapted to him, perhaps to him alone. In no case must he allow his impatience to lead him to advance only with the "bright" half of his class and to let the rest "catch up." He must carefully avoid that *sauve qui peut* system, so common in English, and especially in American schools, a system that has caused American superficiality to pass into a proverb; he must not be quite so anxious to impart a *great number* of facts, but rather to have those he imparts *well understood.* One great cause, perhaps the greatest, of failure in education, is that impatience to "go over much ground," the fact *that* *parents and teachers cannot wait.* Yet the mental as well as the physical growth of the child is, in its early stages, very slow, almost insensible; and this must be constantly kept in view if we would form substantial, thorough minds, capable of rapid acquisition and powerful, correct application of knowledge. The teacher's principal duty is to constantly probe the child's mind, in regard to its capacity and power, and not to allow it to try itself upon subjects beyond its full and easy grasp. The teacher must neither overcharge the child's mind nor force its development; he must simply encourage, with unvarying kindness, its natural growth: for young minds will bear no forcing; and minds that have been forced in their development are like hot-house plants—insipid, bloated, feeble.

Let the teacher also beware of irritability, the result of impatience and want of self-control. The irritable teacher will never be able to command either the love or respect of his pupils; he will be ridiculed by them, or at best feared. In either case he cannot be successful, because, in the absence of respect, the pupil will not attach sufficient importance to the teacher's word and advice; and the child who is afraid will not venture to utter and defend its childish views and opinions, and will never dare to observe independently for fear of making mistakes. The teacher must be a kind friend and patient guide, to whom the child looks for advice and protection; his intercourse with the pupils must be marked by an unvarying kindness and cordial sympathy with all the child's notions and with all the child's efforts at progress or exercise. Somebody has said that it is "next to impossible to *govern* children, but extremely easy to *manage* them. Let the teacher then, by all means, *manage the children with kindness and sympathy*.

In this connection we would warn the teacher against self-conceit and false dignity. The teacher who looks down upon his pupils not only as inferiors, but as inferiors who can never reach his exalted position; who considers himself a storehouse of all knowledge, past, present, and future; who looks upon contradiction as a crime, and upon dissension from his opinions as a heresy, will never do as a teacher, at least not in a republic; for, being himself a petty tyrant, he will turn out in his pupils a race of petty tyrants, the very class of people that are injurious and ruinous to free institutions. False dignity, that mock gravity which is put on by some men as a mask to cover disgracing blemishes and faults, is, if possible, still more dangerous than its twin sister, self-conceit. A person who never smiles can never be a successful teacher, since, in the presence of such a person, the pupil can never feel that ease, that want of restraint, that self-confidence so essential to success.

Besides, the teacher must never fail to enter the school-room well prepared, not only in regard to the *object* on which he intends to exercise his class, but upon the *order* in which the exercises are to be conducted, and upon the manner in which the individual pupils are to be interrogated. He must himself have clear and distinct ideas, must himself observe accurately and think carefully, must himself express concisely and correctly.

Without these requsites the teacher will fail in Object-teaching, as well as in all other teaching; with them he will accomplish results for which generations will thank him.

CHAPTER IV.

GRAMMAR — DIVISION OF THE SUBJECT — ENTRANCE OF THE PUPIL — NAMES OF THINGS — READING AND WRITING METHOD.

GRAMMAR is the art of *conveying* ideas correctly by means of language and of *understanding* ideas so conveyed by others: it is *the art of using language correctly*. This definition of the terms will suit our purposes fully. It is sufficiently comprehensive: for it includes not only all modes of expressing ideas by language—reading, speaking, and writing; but also the power of interpreting ideas so expressed. It is sufficiently concise, for it does not admit anything not properly belonging to the art. It is obvious, then, that grammar must be one of the first subjects to engage the attention of schools; since language is the principal, if not the only means of communication in the school, an indispensable handmaid needed in the study and application of every science. The school must, from the beginning, give the pupil the art of using language correctly; and in the proportion in which it does this, other things being equal, will the pupils be successful in their studies. It is equally obvious, as has been shown before, that ideas must be formed before they can be expressed: hence the well-known aphorism of object-teachers, "*Ideas before words.*"

Elementary teaching in language implies then the development, cultivation, and direction of a general power of forming and expressing ideas correctly: and this is to be accomplished by the so-called object-lessons. We would not be understood to mean that this is the *only* aim of these lessons. Other important aims may and should be connected with it, such as the introduction into special subjects of study—into arithmetic, geometry, geography, etc., or the mutual application of principles taught in these sciences. But we would be understood to mean that it is the *principal* aim. This has been sadly disregarded in the introduction of object-lessons into English schools, and acquisition of knowledge about certain objects has generally been made the main aim of these lessons to such an extent that they have degenerated into lessons on common things, and that manuals upon the subject have assumed the form of young compendia of sciences and arts, tending to produce that miserable scatter brain wisdom that *seems* so much and *is* so little.

For the *sake of convenience*, we shall divide our illustrations into three periods; the first dealing principally with the development of perception, the second with conception, and the third with comparison and generalization.

In the first exercises, the teacher's chief aim should be to gain the pupil's affection and confidence, so as to make the transition from home to school discipline as easy as possible; indeed, the child should be taught to look upon the transition as rather a pleasant one. Still the teacher should not go too far in this and make school duties all play. The children must feel that there is a transition, an actual change—a change, too, from mere amusement to a real duty, but that duty agreeable; they must feel that they have begun to work, but the work must be made interesting—they must be taught to like their work. It must be clothed attractively, so that they will approach it with cheerful hearts and willing minds.

At first the teacher gains the affection of the children, by making their acquaintance in a kind, friendly manner. Let him rise and approach the children with a smiling, open face; let all his words and gestures tell them that he is a kind friend. He asks their names, perhaps; then repeats them to find if he remembers and, intentionally, makes some mistake—calls a girl by a boy's name, and lets the amused pupils, who feel nearer to him for the pleasure they had in *discovering* the mistake, correct it and give the reason for the correction.

He then asks the pupils to name the things they see in the room. They mention everything in the wildest confusion. The teacher listens patiently for a few seconds, then kindly bids them stop, and tells them to begin at a certain part of the room and to speak one at a time; and, when all the objects have been mentioned, each child naming two or three in turn, the teacher pointing at the objects, he lets the whole class name in chorus the objects at which one of the brighter pupils points. He will find that if the first exercise has gained him the pupils' affection, this second one has established him in their confidence fully and permanently, since the children readily appreciate the better success they have had under his guidance; and he is now fully prepared to keep in view, in the subsequent exercises, the principal ends to be attained—*the training of the senses, the cultivation of habits of observation, the development of the perceptive faculties, and the use of correct language.*[*]

The children are now called upon to mention a certain number of objects (six, ten, twelve) in the parlor, bedroom, kitchen, attic, cellar, wood-house, stable, barn, etc., in the street, river, woods, field, meadow, garden, pond, creek, orchard, city, village, etc. Again, they are asked to mention objects made of leather, wool, cotton, silk, linen, velvet, wood, paper, iron, tin, brass, steel, lead, stone, glass, china, bricks, etc., or a certain number of animals, of four-footed animals, of birds, insects, fishes, etc. In the answers, constant attention must be paid to the pronunciation of words—distinct and correct articulation being one of the first requisites of correct language. Yet this should not be carried on to such an extent as to make it irksome to the pupils. The child can attain perfection only gradually. It should, therefore, be taught to make a constant and conscious, but gradual effort to articulate correctly; and the teacher should *encourage*, but not *drive.* Indeed, the child needs no driving: it will work cheerfully and zealously with the teacher who has learned the art of working with the child.

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[*] W. H. Wells, *Graded Schools.*

The child should also be taught to always answer in full simple sentences and to express the same idea in various ways. This may be most readily accomplished by teaching the child to frame the answers according to the questions. The teacher asks, "What do you see in this room? What do we find? What can you discover? What can you name in this room?" And the children answer accordingly: "We see, find, can discover, can name in this room such objects."

The above sketch contains work for many weeks to be done in connection with reading and writing lessons, and lessons on number, form, and natural objects. For reading and writing we shall append a sketch corresponding in extent with these object-lessons. For this purpose, we shall suppose that the children have learned to speak distinctly, in different object-lessons, the words *rat*, *cat*, *hat*, *mat*.* The teacher may now single these words out, and write them in various arrangements upon the black-board, until the pupils have learned to recognize them readily. He may then teach them to pronounce the same words successively *r–at*, *c–at*, *h–at*, *m–at*, and lead them to discover that the sound *at* has in every case the sign *at*. This sign they should at once learn to imitate upon their slates. Successive lessons will then cluster around this nucleus the discovery of the signs *m*, *r*, *f*, *s*, *c*, *h*, and others for corresponding sounds. The children should learn to imitate these in connection with the first, and to write *mat*, *rat*, *fat*, *sat*, *cat*, *hat*, etc. In the same way, the words *pin*, *fin*, *tin*, *chin*, will furnish the nucleus *in*; *lot*, *pot*, *dot*, the nucleus *ot*; *pen*, *hen*, *den*, *men*, the nucleus *en*; *sun*, *gun*, *nun*, *tun*, the nucleus *un*, etc. These may be treated in the same way—combined with single consonants, read and written by the children, until they are familiar with the principal single consonants. The teacher may then separate *at* into *a–t*, *in* into *i–n*, *ot* into *o–t*, etc.; and thus lead the pupils into the study and application of the short vowel sounds. Having found *a short*, he may form *ab*, *ad*, *ag*, *am*, *an*, *ap*, *as*, etc.; and from these, by prefixing single, or sometimes, by way of introduction, double consonants, he may form a number of words with which the child is familiar. Then he may continue with double consonants and with the leading long vowel sounds and signs.

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* Barnard's *Object-teaching*, p. 280.

The reading and writing of simple sentences may begin long before all this is completed. Thus we shall suppose the pupils to be familiar with the sounds and signs *at*, *in*, *ot*, *r*, *c*, *f*, *h*. It will then be necessary to teach them the sounds and signs of only the two little words *the* and *is*, in order to enable them to read and write: *the cat is fat, the rat is fat, the pin is hot, the fat is in the cat, the fat is in the rat, the pin is in the cat, the pin is in the rat, the cat is in the hot fat, the hot pin is in the fat rat*, and a number of other similar sentences.

We do not insist on the necessity of learning the letters in the order mentioned—single consonants, short vowels, double consonants, long vowels; we only prefer this order, because the consonants are the most uniform in their signs and the long vowels the most varied, and we have inserted the short vowels between single and double consonants, in order to obtain clear nuclei for interesting practical work on the part of the pupils. But we do insist on the necessity of combining reading and writing from the beginning; of leading the child from the *sound* to the *sign*, and from this to the *name* of the letter; of having the first exercises in reading and writing only in the written forms of letters; and of not introducing the printed forms of letters, until the child is thoroughly familiar with the former.

CHAPTER V.

GRAMMAR CONTINUED—LESSONS ON SINGLE OBJECTS—PRIMARY OBJECT OF THESE LESSONS.

As soon as the exercises, suggested in the first sketch on object-lessons, threaten to become too irksome to the pupils or the material insufficient for the corresponding reading and writing exercises, the teacher may begin with lessons on some single objects. These lessons should, at first, alternate with the former: for no class of exercises should be commenced or discontinued abruptly, but one class should gradually merge into another. Before beginning the lessons, the teacher should have carefully determined what ideas he wants to develop and impress, what he wants the children to learn; else the lesson will be, at best, imperfect. He should, therefore, keep a blank book in which he writes down an outline of each lesson before giving it. We append a few sketches of lessons on single objects by way of illustration and suggestion, prefixing, in each case, the disposition of the subject upon which the teacher is supposed to have determined.

1. A Sheet of Paper.

The teacher has determined upon the following disposition:

A sheet of paper: 1. *White*; 2. *Face* (surface); 3. Edge; 4. Corner.

He then exhibits the sheet of paper to his pupils and, as expediency may require, asks them in turn separately or collectively as a class. Perhaps the following conversation, in which the teacher's words are quoted, will ensue:

"What do you see in my hand?" I see a sheet (piece) of paper in your hand. "What is the color of this sheet of paper?" It is *white.* "What kind of paper is this, then?" It is *white* paper. "Can you name any other things in this room that are *white?*" Sally's apron is *white.* The ceiling and the walls are *white.* Your collar is *white.* "Name some *white* things at your house, on the street, etc." "What *white* things do we sometimes spread over the table?" "On what *white* thing do we sleep at night?" "What *white* thing does winter bring us?" and other similar questions to fix the impression "*white.*"

"What do you call this part of the sheet of paper?" (presenting a face and passing a hand over it). We call it a side. "How many sides has this sheet of paper?" It has two sides. "Very good; but you must use another word for side and call this a *face*. What should you call it?" A *face*. "Then, how many *faces* has this sheet of paper?" It has two *faces*. "Show me something else that has two *faces*—something that has six *faces*." "How many *faces* has this book? this mustard-box? this marble? this cork?"

"What do the two *faces* do here?" (passing a finger of each hand along the respective faces until they meet at the edge). They come together—they meet. "And what do they form (make) where they meet?" They form (make) a line. "Yes, and we call this line an *edge*. Now, what is an *edge*, Sally?" It is a line formed where two faces meet. (Sally will need some assistance in this answer.) "How many *edges* do you see on this sheet of paper?" "Count them." "Show me the *edges* on this book." "Count the *edges* on this box." "How many *edges* has this marble?" etc.

In a similar manner the idea "*corner*" is imparted and fixed, and the children may be requested to bring for the next lesson some small object that has four edges or corners, twelve edges and eight corners, no edges and no corners, two edges and two corners, etc.

In the disposition at the head of the lesson, the words *white* and *face* are printed in italics; because the teacher is supposed to have underscored them, having selected them for blackboard and slate exercises. These may be made at the close of the lesson. Having by some question again called out the answer, *It is white*, the teacher may write the word *white* on the blackboard and let the pupils sound it, spell it, read it, and at last write it on their slates. He may then assist them in writing the sentence, *the paper is white ;* and, according to circumstances, let them write other similar sentences, either independently, with his assistance, or by dictation, *e. g.:* milk is white ; snow is white ; the wall is white ; linen is white ; the sheet is white ; the shirt is white.

In a similar way he may practice with the word "*face*," succeeding perhaps in eliciting sentences similar to the following : the paper has two faces ; the face is white ; the face is red ; the face is clean ; the face shines.

2. A TIN CUP.

A tin cup : 1. Curved ; 2. Straight ; 3. *On ;* 4. *Over ;* 5. *Under ;* 6. Above ; 7. Below ; 8. Between.

"Here is a tin cup; can any one of you tell me what kind of a line this edge makes?" It makes a *round* line. "Very good; but round is not the right word. Can you tell me another word for round?" It makes a *crooked* line. "That is better; but I can tell you a still better word; we call this a *curved* line." "Name some things in this room that show *curved* lines." "Are there any *curved* lines about this inkstand?" "Show me the *curved* lines on this hat, this box, etc." "What kind of a line does the edge of this rule make?" It makes a *straight* line. "What kind of a line does the edge make now?" (bending the rule). It makes a *curved* line.

The teacher then causes the pupils to point out and count the straight and curved lines of various objects; to point out the straight and curved lines in some letters; to name letters that show a certain number of straight and curved lines, no straight lines, etc. He draws straight and curved lines on the blackboard, and causes some children to do the same and all to draw similar lines on their slates, etc.

"Where is the tin cup now, Mary?" It is *on* your hand. "Put it *on* the table; and now tell me where the table is," etc. In a similar manner the remaining ideas may be called forth and fixed; the tin cup and other objects placed into different positions with regard to one another, both by the teacher and by the pupils; the relative positions of various objects in the room determined, etc.

The blackboard and slate exercises with the words *on* and *over* would elicit sentences like the following: The table is on the floor; the slate is on the desk; the pencil is on the slate; the man is on the fence; the cat is on the rug; the roof is over the house; the sky is over us; the tree is over the bench; the dog jumps over the creek; the duck swims over the river.

3. A Ribbon.

A ribbon: 1. Wavy; 2. Spiral; 3. Broad; 4. Narrow; 5. Heavy; 6. Light; 7. *Long;* 8. *Short.*

The ideas *wavy* and *spiral* may be called forth by so arranging the ribbon as to cause one of its edges to exhibit these lines. The ideas *broad* and *narrow* may be presented by means of two ribbons of the same length, color, etc., but differing considerably in breadth. *Heavy* and *light* may be introduced by causing some of the children to feel the difference in weight between the ribbon and a piece of lead*;* *long* and *short* by means of ribbons of the same piece, differing only in length. In each case exercises must be made to impress these ideas firmly on the mind: the children point out *long* and *short* objects, name *heavy* and *light* things, bring for the next lesson a *broad* leaf and a *narrow* leaf, arrange the edges of flexible objects in *wavy* and *spiral* lines, etc.

The blackboard and slate exercises, with the words *long* and *short,* will yield sentences like the following: The line is long; the dot is short; the pen is long; the pencil is short; the slate is long; the book is short. I have a long slate; he has a short pen; you have a long ribbon: we have a short cup. The long slate is black; the short cup is green; the long pen is bad; the short pencil is good.

It is not expected, and, indeed, it could scarcely be deemed judicious, that the teacher should present at each exercise new ideas or as great a number of new ideas as the foregoing lessons indicate. On the contrary, frequent reviews are necessary, also lessons which are partly reviews and which present only one or two new ideas, according to dispositions like the following:

1. *Review:* 1, face; 2, edge; 3, corner; 4, angle; 5, line.

2. *A Hat:* (review); 1, straight; 2, curved; 3, wavy; 4, spiral.

3. *A Rule:* 1, long (review); 2, short (review); 3, *thick* (new idea); 4, *thin* (new idea); 5, broad (review); 6, narrow (review.)

We would also warn the teacher against adhering too strictly to the limits of instruction, as well as to the form of instruction, pointed out in this period. Circumstances may and, no doubt, will arise in the experience of every teacher, requiring material modifications in both. To keep up the interest in the subject, teachers will be compelled to use many variations and artifices which only their own ingenuity and interest in the work can suggest and invent.

On the other hand, we would impress upon the minds of teachers the necessity of keeping in view, in all exercises, the fact that the *primary* aim of these *exercises from objects* is, not information about the object, but *the development of clear perception and clear expression.* Thus, the sheet of paper was not taken up with a view of giving the pupils information about the paper, but to teach the ideas, white, surface, edge, corner and the clear expression of these ideas, whenever practicable. Hence the pains taken to impress these ideas firmly, by means of various and copious exercises, as soon as they have been developed. Referring to a previous chapter, we would say, hence that lively, interesting application—that immediate, extensive *synthesis*—as soon as the teacher has assured himself that the pupils have succeeded in grasping the idea, have succeeded in separating it—in *analyzing* it away from the object in question. Of course the pupils will in these lessons gain a great deal of information about the objects used, and this information is sufficiently valuable to render its acquisition a *desirable secondary* aim.

CHAPTER VI.

GRAMMAR CONTINUED — SECOND YEAR — PARTS OF OBJECTS—LESSONS ON SINGLE OBJECTS—REVIEWS—NEW IDEAS—SLATE EXERCISES.

When the children have reached the second year of their school-life, they may be taught to name the *parts of objects* in the same manner in which, during the first year, they were taught to name objects themselves. They name the parts of a book (cover, back, leaves), of a pin (head, shaft, point), of a chair (legs, rounds, seat, back); the parts of a door, a window, a house, a cart, a carriage, a knife, an inkstand, etc. In these exercises, the teacher should be careful not to let the children call parts that which is merely a property or an accident. A part of a material object is a portion of it; if the part is removed, the object will be diminished in size and weight: *the part of an object must, therefore, always have three dimensions and be material.* It is improper, then, to consider as parts the points, lines, and surfaces of objects; to enumerate inside, outside, faces, edges, angles, pores, etc., among the parts. To do so will give the pupils a very misty idea of what parts really are. The teacher,* who has enumerated as the parts of refined sugar "surface, edges, middle, crystals, grains, pores, would certainly be sorely troubled, if he should be called upon to produce the surface, the edges, the middle, and the pores, after the removal of the "crystals and grains;" and the same teacher, who informs us that the parts of a cork are "the ends, *the surface, the faces,* and the edge, would find it difficult to compute the loss of weight which the removal of these parts would occasion in the cork.

The exercises upon the parts of objects should be varied in many ways, so as to arouse and maintain a lively interest in the pupils. The teacher points out the parts of objects, and the pupils name them; or the pupils point out the parts which the teacher names; or they indicate the position of parts in words, *e. g.*: "Where is the head of the pin?" It is above the shaft. "Where is the shaft?" It is between the head and the point. Again, the pupils are asked to name a certain number (two, three, four) of parts of a carriage, of a house, of a window, of a door, etc.; to name objects in which they can distinguish only two, three, or four parts; to bring to-morrow some small object that shows two, three, or four parts. (This last exercise will be found peculiarly fertile.) Again, we ask the pupils to name the parts of a window that are made of wood, the parts of a door that are made of iron, etc.; to name that part of a knife which is used for cutting, to point out on a chair the part on which we sit, etc.; or we ask, what is the use of the head of the pin, of the slate-frame, the book-cover, etc.—without, however, entering further into a consideration of the materials and uses of objects than is necessary to excite and keep up the interest in the lesson.

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* Sheldon on *Object Lessons.*

In connection with these lessons, we have lessons on single objects, with the design of reviewing the ideas gained during the first year and of developing and fixing new and kindred ideas. We shall here again, in a few examples, indicate how this may be carried out, without, however, presenting the examples in the form of conversations, since the inexperienced teacher is too prone to follow the type so closely as to lose sight altogether of circumstances requiring important modifications in the manner of presenting the subject to the pupils. We shall, therefore, merely give some models of dispositions to be made by the teacher before the lessons, and indicate in a general way how the lessons should be conducted.

1. *A Rule.* — Surface, edge, corner (review); smooth, rough, oblong (new ideas).

2. *A Watch.* — Curved, straight (review); hard, soft, circular (new ideas).

3. *A Cork.*—Relations of position (review); velvety, porous (new ideas).

4. *Vinegar.*—Wet, dry, sour, tasteless, dark red, light red.

5. *Piece of Glass.*—Line, angle (review); right, acute, obtuse angles, colorless (new ideas).

6. *A Hat.*—Curved, wavy (review); circle, ring (new ideas).

7. *A Marble.*—Smooth, rough, hard, soft, tasteless (review); sphere (new idea).

The objects of the reviews in these lessons are, in the first place, to assure the teacher that the pupil has a clear conception of the ideas taught during the previous year, which are necessary for the development of the new ideas to be illustrated in the respective lessons; and, in the next place, to fix more firmly in the pupil's mind the valuable knowledge previously acquired. The review questions are therefore direct, to the point, without any attempt at suggesting, guiding, or drawing out. We ask, for instance, simply: "What is a face?" or "How many faces has this object?" or "Why do you call this a face?" without directing the child's attention to the face by preliminary questions. If the questioned pupil cannot give an answer, we do not stop to explain or draw out, but pass to the next, or call upon the class to answer; since the answer given by the class usually serves all the purposes of repeated instruction for those who have forgotten. Should the class however fail (a rare case), it becomes necessary to ask the question in a different form, or to put additional questions. Of course, we also omit the questions and exercises, employed previously for fixing the newly formed ideas, such as (in the above instance) pointing out and counting the faces on different objects, mentioning and bringing objects with a certain number of faces, etc.

In developing the new ideas, we are guided by the same principles and considerations that were indicated in the sketch for the first year. Yet we should constantly keep in mind what the child has already acquired and frame our questions accordingly. This has a double advantage: it saves time and it teaches the child to apply what it has learned. The latter especially, although so sadly neglected in the majority of schools, is one of the most important objects of education; since, without it, education is really all but useless.

While during the first year we exercise chiefly the sense of sight, we call into action now the other senses, particularly those of touch and taste. Until the child has learned to use both these senses independently, it is well, perhaps necessary, that the impressions upon them be made in the lessons while the child closes his eyes. A pupil is called out and told to close his eyes, the teacher then seizes his wrist, guides the ends of his fingers along some object, say a piece of velvet, which he has not previously seen in the teacher's hands, and asks him: "What are you touching?" "How do you know it to be a piece of velvet," etc. Another pupil may then step out, touch the velvet to get the impression of smoothness, and then close his eyes, while the teacher gently passes the ends of his fingers over some rough surface (a piece of sand paper, the cross section of a piece of wood) and asks him similar questions to develop the idea and term *rough*. Both these ideas, *smooth* and *rough*, may then be fixed by the means already indicated.

Again, we shall suppose that we had some conversations about vinegar, and that it remains to teach the impressions *sour* and *sweet*. A little girl is called and told to close her eyes and to open her mouth, the teacher implying that he intends to put some vinegar on her tongue; but instead of vinegar he places a drop of sugared water on it. The little girl will startle and tell him that it is not vinegar.

She is then led to tell how she knows it not to be vinegar, what she thinks it to be, why she thinks so, etc. In a similar manner all other impressions upon the senses should be introduced. They may then be fixed as above.

The greatest difficulty in regard to the sense of taste will be found in imparting the idea, *tasteless.* Any object, though tasteless, placed upon the tongue, will create a sensation of touch which the child cannot well separate from the sensation of taste. The child will say such an object tastes cold or warm, smooth or rough, etc. How to overcome this we must leave entirely to the teacher's individual ingenuity. Never in the author's experience, has this been overcome in one lesson or in two lessons, but only after repeated, patient exercises, comparing the sensations sweet, sour, etc., on the one hand, with the sensations cold, warm, rough, smooth, etc., on the other. Yet every earnest teacher will ultimately succeed in enabling the children to fully distinguish these impressions, and to arrive at a clear conception of *tasteless.*

By far easier it will be to teach the idea, *colorless.* The child readily perceives that pieces of colored glass impart their respective hues to objects seen through them; that colored liquids lend their tinges to objects immersed in them, while colorless glass and colorless water have no more effect upon the color of objects seen through them, than the opening in a ring or the spaces between the fingers.

In the slate exercises the pupils may continue to be drilled, as previously, in writing sentences, acquainting them *practically* with the principal uses of nouns in the subject and in connection with the leading prepositions; of adjectives in the positive degree; of prepositions, where they indicate relations of position, direction, and, perhaps, time and possession; and of verbs, chiefly intransitive verbs and, if transitive, in the active voice.

For exercises in verbs, the material is best obtained in the first lessons on natural objects, introductory to natural history. The child has had a lesson on the dog and is then induced to write, by dictation, with the aid of the teacher, or independently, sentences like the following: The dog barks, the dog runs, the dog snaps, the dog bites, the dog sits, the dog eats, the dog drinks, the dog hunts. Or, starting with the verb *bites*, as a basis, he writes: The dog bites, the cat bites, the rat bites, the fox bites, the snake bites, the fish bites. Or, extending the exercise to inanimate objects, the teacher requires sentences with a number (3. 6.) of objects that *stand* or *lie*, or *break*, eliciting perhaps: the table stands, the tree stands, John stands,—the book lies, the slate lies, the dog lies,—the glass breaks, the slate breaks, the cup breaks.

Exercises may also be made to practice different forms of predication with the same subject. The teacher may write upon the black-board the following outline for the guidance of the pupils:

What is	the dog ?	The dog is large.
What thing is		The dog is an animal.
What has		The dog has a tail.
What does		The dog barks.

He may then, having assured himself that the pupils understand what they are about to do, require them to write four similar sentences about a certain number of objects, the names of which may be given or not.

Again, exercises on the formation of the plural are in order, and the teacher need not avoid the irregular forms in ordinary words. The children write sentences according to the following formulas:

1.	The dog bites.	Two dogs bite.	(All) dogs bite.
	The cat mews.	Two cats mew.	(All) cats mew.
	The goose flies.	Two geese fly.	(All) geese fly.
2.	The dog is an animal.	Dogs are animals.	
	The cat is an animal.	Cats are animals.	
	The goose is a bird.	Geese are birds.	

3. The dog has a snout.	Dogs have snouts.
The cat has a tail.	Cats have tails.
The goose has a bill.	Geese have bills.
4. The dog is large.	Dogs are large.
The dog is a quadruped.	Dogs are quadrupeds.
The dog barks.	Dogs bark.

Exercises on *person*, if made at all, should as yet be made very cautiously and sparingly. On the other hand, constant and strict attention must be paid to the spelling, to capitalization, and punctuation, as far as they are needed in these sentences.

CHAPTER VII.

GRAMMAR CONTINUED—SECOND PERIOD (THIRD YEAR)—INFORMATION ABOUT OBJECTS—DESCRIPTIONS—METHOD—DEFINITIONS—ALLIED QUALITIES—OPPOSITE QUALITIES—ENIGMAS.

THE pupils have now arrived at the second period, when special prominence is to be given to the cultivation of conception. From the sketches in the previous chapter, it appears that we do not wish to convey the idea that the pupils are not to exercise the conceptive powers, until they reach this period (perhaps the third school year). By means of the frequent reviews, and the abundant slate exercises, a great deal has been done during the first period to train memory and imagination; and the majority of perceptions have been made so often that the child has already formed conceptions of them. These may be vague and the child may be unable to render them in words, but they are sufficiently clear to enable the child to use them and to enable us to consider him fully introduced into the use of the power of conception. During this period, however, special care is bestowed upon this power, and upon its auxiliaries, memory and imagination, while at the same time the perceptive power is by no means neglected and material for new and various perceptions is constantly offered.

Information about objects is now no longer merely a desirable secondary end; but becomes essential, being needed for the formation of accurate and complete conceptions. Hence, in preparing dispositions for the lessons, as well as in the lessons themselves, we pursue a different course from that pursued in the previous period. We exhaust the subject as far as the powers of observation in the pupils permit. And this we do *methodically*, so as to teach the pupils the power of rapid, complete, and accurate observation, and to prepare them for concise, complete, and accurate description. As types, we would propose to teachers the following dispositions of lessons:

1. A Plate of Glass.

I. *Impressions on the sense of sight.*
   1. Rectangular.
   2. Green.
   3. Transparent.
   4. Bright (reflective).

II. *Impressions on the sense of touch.*
  5. Hard.
  6. Smooth.
  7. Cold.

III. *Impressions on the sense of taste.*
  8. Tasteless.

IV. *Impressions on the sense of smell.*
  9. Odorless.

V. *Impressions on the sense of hearing.*
  10. Resonant (?).

VI. *Mixed impressions* (obtained by more or less complicated experiments).
  11. Stiff.
  12. Brittle.
  13. Slightly elastic.

2. A RUBBER BALL.

I. *Sight.*—1, spherical; 2, lead-colored; 3, opaque; 4, dull.
II. *Touch.*—5, velvety; 6, soft.
III. *Taste.*—7, tasteless.
IV. *Odor.*—8, odorless.
V. *Sound.*—9, resonant (?).
VI. *Mixed impressions.*—10, elastic; 11, compressible (?); 12, expansible (?); 13, tough.

3. A Tin Tube.

Cylindrical, hollow, opaque, bright; smooth, hard, cold; tasteless; odorless; flexible, slightly elastic; tenacious, (?) metallic (?).

4. A Needle.

Cylindrical, conical towards the point, flattened and perforated by an oval hole at the other end, steel gray, opaque, bright; smooth, hard; tasteless; odorless; elastic, brittle, slightly flexible.

5. A Rope.

Cylindrical, white, opaque, dull; smooth, not very soft; tasteless; odorless; flexible, slightly elastic, fibrous, tough, vegetable (?).

6. A Sponge.

Irregular in shape, light brown, opaque, dull; velvety, soft, light; tasteless; odorless; compressible, elastic, porous, absorbent (?).

In determining upon the propriety of including in these dispositions certain less obvious qualities, the presence of which is to be determined by subjecting the object to more or less complicated experiments, the teacher must be guided by the capacity and the advancement of his pupils, by the relation which that quality holds to the uses of that object, by the necessity of that quality for a sufficiently clear conception of the object, and by other circumstances. The names of some of these qualities, *e. g.*, compressible, flexible, and others have been distinguished, in the above types, by an interrogation mark to indicate that they may or may not be taught according to circumstances. Indeed we do not insist upon anything in these types except, first, that the facts must be so arranged that all the impressions upon the same sense may be presented as a connected series, not interrupted by the impressions upon the other senses—the impressions upon the sense of sight must be finished before we proceed to the sense of touch, etc.; and, second, that, in the exercise upon various objects, the respective senses be called into action in the same order. In this way alone can the pupil acquire *method* in his observations and in his descriptions; and both his observations and descriptions will increase in accuracy and completeness and, consequently, in value, as they increase in method.

We should also bestow special attention during this period upon the definitions of the terms, whether they represent "new ideas" or ideas taught in the previous period. It is evident that this should be the case, since the expression of the definition is the only test the teacher can have of the scope and correctness of the respective conceptions in the pupil's mind. If the pupils have been well taught, this formation of definitions will be found a very pleasant and fertile exercise. Sometimes, though not too frequently, during the first half of this period, we call for definitions of the same idea in different terms; generally, however, we are satisfied with developing in terms, intelligible to the pupils, one good definition which the class will adopt as a standard. The following definitions will serve as types:

Anything, through which we can see objects (distinctly), is called *transparent.*

Things are *opaque,* when they do not let light pass.

We say a rope is *flexible,* because we can bend it.

We call things *brittle,* when they are easily broken.

We say steel is *hard,* because it resists pressure (?).

When a term is applied in different senses, it will not do to confuse the pupils by giving the different meanings at once. Thus, while studying the *hardness of steel,* we should avoid all allusions to *hard water.*

Occasionally the lessons may be varied in such a manner as to teach at the same time qualities allied or opposed to each other. Thus, after discovering that glass is *transparent*, the child may be guided to discover that paper is *translucent*, tin *opaque*, etc. At any rate, whenever a new quality has been discovered, the pupils should mention several objects possessing this quality, and several that do not possess it, or we should ask (in the case of transparent): "Is this book transparent?" "Why do you say that glass is transparent?" "Why do you say that iron is not transparent?" and other similar questions, as has been partially indicated in the previous chapter.

Again, we ask occasionally, in separate exercises, for the opposites of qualities. The teacher will mention certain qualities rapidly, and the pupils, in turn or collectively, will name their opposites—thus:

Teacher.	*Pupil.*	*Teacher.*	*Pupil.*
Soft,	Hard.	Smooth,	Rough.
Light,	Heavy.	Elastic,	Inelastic.
Brittle,	Tough.	Odorous,	Odorless.
Flexible,	Stiff.	Sapid,	Insipid.
Opaque,	Transparent.	Cold,	Warm.
Bright,	Dull.	White,	Black.

Again, we cause the children to name a certain number of objects, possessing qualities mentioned by the teacher. For instance:

Teacher.	*Pupils.*
Soft?	Cloth, feathers, cotton.
Light?	Feathers, cork, paper.
Brittle?	Glass, china, sugar.
Flexible?	Rope, paper, ribbon.
Opaque?	Slate, iron, wood.
Bright?	Silver, brass, china.

Another very useful exercise, and one in which the pupils will be particularly interested, is to describe an object without naming it, and to let the pupils guess the name, or to let some of the brighter pupils form such riddles for solution by the class. This exercise has the double advantage of arousing or maintaining the pupil's interest and of furnishing them good models for imitation. Thus the teacher, or a pupil, says: "I am thinking of a cylindrical object; its color is light brown; it is opaque and dull; it feels soft, velvety, and is very light; it has neither taste nor smell; and it is elastic, porous, and quite tough." Probably the pupils will find it easy to guess the name of the object. Should they hesitate, some of the uses of the object may be added, or some other fact connected with it that may facilitate the solution.

If the answer has been found, the teacher should sometimes require a proof for its correctness, which would, of course, result in a description of the object on the part of the pupil. If the answer is incorrect, the pupil is skillfully led to discover his mistake himself and to correct it himself. An ingenious teacher placed a number of objects on a table before her, described some one of them, asked a pupil to pick out from the collection the one described, and then caused the pupil to describe the object selected. Sometimes she should describe an object, not on the table, an artifice which puzzled her pupils only the first time: the ludicrous errors which they committed in their eagerness to find the object described on the table, made them remarkably careful and circumspect for the future — ever after they looked before they leaped. Sometimes again she would take up an object and describe it with occasional mistakes, the eager pupils rarely allowing these mistakes to pass uncorrected. No doubt the germs of self-reliance, which that teacher planted in the souls of her pupils, will bring forth delightful fruit.

CHAPTER VIII.

SECOND PERIOD CONTINUED—SLATE EXERCISES—DEFINITIONS—DESCRIPTIONS—SPECIAL FORMS OF EXPRESSION—OBJECTIVE CASE—POSSESSIVE CASE—PRONOUNS—ADJECTIVES—ADVERBS.

The slate exercises, during the first half of this period, are again of two kinds, either in direct connection with the exercises sketched above, or more independently practicing some special forms of expression.

The exercises of the first class consist principally in the writing of definitions with a view of fixing them firmly in the minds of the pupils, and in the writing of descriptions of objects examined. Supposing, for instance, that an acceptable definition of the term *brittle* has been developed, we let the children write this definition, and then fix it by means of exercises like the following:

Glass is brittle, because it is easily broken.
China is brittle, because it is easily broken.
Coal is brittle, because it is easily broken.
Sugar is brittle, because it is easily broken.

Or, like the following:

Glass is easily broken, therefore we call it brittle.

China is easily broken, therefore we call it brittle, etc., etc.

The ingenuity of the teacher will readily modify these types, according to circumstances. For descriptions of objects we offer the following types:

1. A Lump of Sugar.

The lump of sugar is cubical; it is white; it is opaque; it is sparkling; it is hard; it is rough; it is sweet; it is odorless; it is soluble (in water); it is friable.

2. A Copper Cent.

The copper cent is cylindrical, red (copper colored), opaque, and bright. It is hard and smooth. It is tasteless. It is odorless. It is resonant. It is insoluble (in water), fusible and metallic.

3. A Cork.

A cork looks cylindrical, light brown, opaque, and dull. It feels soft and velvety. It is tasteless and odorless. It is porous, light, elastic, inflammable, and vegetable.

Or we may let the pupil occasionally write skeleton descriptions:

4. Water.

Colorless,
Transparent,
Bright,
Wet,
Tasteless,
Odorless,
Liquid,
Wholesome.

5. Charcoal.

Black, opaque, dull,
Hard, rough, tasteless,
Odorless, brittle,
Inflammable, combustible,
Porous, absorbent,
Vegetable.

6. A Tallow Candle.

Parts.	*Qualities.*
Tallow.	The tallow is cylindrical.
Wick.	white.
	opaque (transparent).
	dull.
	not very hard.
	smooth, greasy, etc., etc.
	The wick is cylindrical.
	white.
	opaque.
	dull.
	soft.
	smooth, etc., etc.

In most cases, however, it will be found too difficult a task for the pupils to give the descriptions of compound objects, and it will be preferable to defer them for the second half of this period.

Frequently, exercises, similar to those suggested for the first period, on selected words are made, with the difference that greater variety in the forms of the sentences is encouraged. Thus, a teacher selected for such an exercise the words *spherical*, *soft*, *elastic*, *tough*, from a lesson on the rubber ball. The following are some of the sentences which her pupils formed :

Peaches are spherical. I have a spherical piece of glass. Spherical things roll. Spherical things have no corners. We cannot find any edges on this spherical object. That piece of wood is spherical. Velvet is soft. I like to sleep on a soft bed. John has a soft cap. Sally has a soft hand. A soft peach is good to eat. Steel is elastic. Elastic balls jump. This elastic steel is brittle. Are you fond of tough meat? Leather is tough. Glass is not tough, etc.

For special forms of expression we make, *in addition* to the exercises suggested for the first period, exercises on the use of nouns as objects of transitive verbs, and as possessives; on personal pronouns (at least in the nominative case); on the different forms of verbs in the different persons; on the use of several-adjectives predicating of or modifying the same noun; and on adverbs of manner. For these new exercises we offer the following formulas. The teacher may write these or similar formulas on the board, assure himself that the pupils understand the formula, and then require them to write a given number of similar sentences, either with words selected by himself or with words of their own selection. We would here caution the teacher again to be always on the alert in these writing exercises; to move constantly from pupil to pupil, examining their work; and to correct, assist, suggest, wherever it may be needed. The teacher who enthrones herself in easy and sullen dignity upon her rostrum or upon a chair in front of the class, will accomplish very little in these exercises.

Objective Case.

1. The dog sees—whom? The dog sees the man.
2. The dog sees—what? The dog sees a cat?
3. The dog sees— { whom? The dog sees the girl.
   what? The dog sees the meat. }
4. The boy sees the dog. The boy whips the dog.
   The dog bites the boy.
5. The dog sees the boy. The dogs see the boys.

Possessive Case.

6. Whose dog is large? The boy's dog is large.
7. Whose dog barks? The boy's dog barks.
Whose dogs bark? The boys' dogs bark.
8. Whose dog bites the cat? John's dog bites the cat.
Whose dogs bite the cats? John's dogs bite the cats.
9. The dog bites whose(?)cat. The dog bites the girl's cat.

Pronouns.

10. John whips the dog. He is a bad boy.
11. I whip the dog. John whips the dog. He whips the dog.
12. I whip the dog. John and I whip the dog. We whip the dog.
13. I whip the dog. He whips the dog. He and I whip the dog. We whip the dog.
14. John whips the dog. Henry whips the dog. John and Henry whip the dog. They whip the dog.
15. I whip the dog. He whips the dog. We whip the dog. They whip the dog. You whip the dog.

16. I
We
You
They } whip the dog.
He whips the dog.

17. John whips the dog. He whips the dog.
Mary whips the dog. She whips the dog.
18. John falls. He falls.
Mary falls. She falls.
The slate falls. It falls.

Adjectives.

19. The dog is large and beautiful. The large and beautiful dog barks.
20. The dog is young, large, and beautiful. The young, large, and beautiful dog barks.

Adverbs.

21. The dog runs—how? The dog runs swiftly.
22. Sally is nice. Sally reads nicely.
John is bad. John writes badly.

These formulas may be multiplied and varied indefinitely to suit circumstances. As guiding principles in their formation, we would state: 1, They must gradually progress from the known to the unknown; 2, they must, as much as possible, review and combine knowledge and skill previously acquired.

CHAPTER IX.

SECOND PERIOD CONTINUED — TELLING — DEFINITIONS — USES OF OBJECTS — TYPES FOR CONNECTED DESCRIPTIONS.

DURING the second half of this period (about the second half of the third school year), the exercises in description are continued, so as to embrace less obvious qualities, such as solid, fluid, liquid, gaseous, plastic, volatile, edible, nutritious, combustible malleable, ductile, etc. It will be perceived that the greater portion of the impressions represented by these terms, are obtained by more or less complex experiments, for which, *in many cases*, the teacher may very appropriately, and without danger to thoroughness on the part of the pupils, substitute direct instruction or *telling*. Yet he should be careful in the use of this privilege, and beware of contracting the habit of *lecturing* and *explaining*, where this would save the pupils wholesome labor. Lectures, especially by a loved and respected teacher, may charm children of these ages for a time, but they rarely leave fertile impressions; and, as for explaining, it is only lifting the pupil over an obstacle. Should the same obstacle present itself again, the pupil will be as helpless as he was at first, and the teacher will have to explain—to lift again. Let the pupils set their minds to work—let them *labor* with their faculties — let them take difficult questions home again and again, until, by independent effort, *they* have explained them. Of course, the *guiding* and *helping* hand of the teacher will always be useful, nay necessary; but while he guides and helps, he must not take the *pupil's work* upon himself.

The method pursued is the same as that indicated in the previous sketch, although the descriptions are more complete, and the details more rigidly carried out. We need not, therefore, offer new types of dispositions for lessons, since they would resemble those of the previous sketch, with the exception of being more extended. Thus we should, perhaps, add to the disposition on the plate of glass the ideas solid, fusible, insoluble.

Increased attention is paid to definitions, and the pupils are now often required to give definitions of the same idea in different terms. Thus, *opaque* may be defined as follows:

We call an object *opaque*, if we cannot see through it.

Things, that do not let light pass through them, are said to be *opaque.*

If bodies are *opaque,* we cannot see anything through them.

Opaque means not letting any light pass, etc.

Very often connected qualities are contrasted. Thus the teacher asks rapidly the definitions of:

Transparent, semi-transparent, translucent, opaque;

Smooth, velvety, polished, rough;

Brittle, friable, pulverable, tough, tenacious;

Elastic, flexible, pliable, stiff;

Fragrant, aromatic, odorous, pungent, fetid;

Inflammable, combustible, incombustible.

The forms of the definitions given by the pupils should, in this case, be as nearly as possible the same in each series respectively, *e. g.:*

Through a *transparent* object, we can see other objects distinctly.

Through a *semi-transparent* object, we can see everything about other objects, except the color.

Through a *translucent* object, we can only see light (the light coming from other objects).

Through an *opaque* object we cannot see at all.

But here again the teacher must often be satisfied with imperfect definitions, and patiently (not passively) foster and await the development of complete and accurate ones.

Thus, the idea elastic, in a class of girls, went through the following stages of development in the course of two weeks.

Any thing that can be bent is *elastic.*

Any thing that will become straight, after it has been bent, is *elastic.*

Any thing that will become straight, after it has been bent, and any thing that will become shorter again, after it has been stretched, is *elastic.*

Anything that will become straight again, after it has been bent, or shorter again, after it has been stretched, or will expand again, after it has been compressed, is *elastic.*

Anything that will return to its first shape, after it has been bent, stretched, or pressed, is *elastic.*

Anything that will return to its former shape, after it has been forced out of it, is *elastic.*

In the conversational lessons of this grade, the *uses* of objects are frequently taken into consideration, although this is an exercise properly belonging to the next period. It is not sufficient, however, fo the pupils to tell us simply the uses of certain materials or objects; but, from the very beginning, they should learn to discover the relations between the qualities of the materials or objects in question, and their uses. The children can easily understand that leather is used for shoes; but it will be a more difficult and, consequently, a more interesting task for them to discover *why* leather is used for that purpose. Until the pupils have some practice, it is advisable to let them take questions concerning the uses of objects or materials home and to bring their answers the next day.

We shall suppose that the pupils were asked to think about the reasons why leather is used for shoes. The next morning very few will have brought a complete answer. One, perhaps, will say that we use it, because it is *tough* and *soft;* another, because it is *water-proof* and *light*; still another, because it is *durable* and *thin.* In order to convince the pupils of the incompleteness of their answers, we name other substances not suitable for shoes, but having the qualities which they mentioned. Thus, in this case, we tell the first that linen is tough and soft, the second that tin is water-proof and light, the third that glass is durable and thin; and ask them, if these substances could be used as well as leather in making shoes. They will readily see that they have not given a complete answer—that they must increase the number of qualities in their list, and they will at once at least put together the qualities which they have given separately, arriving at the answer, that leather is used in making shoes, because it is *tough, soft, thin, light, water-proof,* and *durable.* According to circumstances, the teacher may be satisfied with this answer, or he may lead them to discover that leather is used also on account of its being *elastic, absorbent,* and *porous.* A few lessons of this kind will develop in the children a high degree of quickness in discovering the relations between the qualities of objects and their uses.

To insure success, the teacher should, in a separate part of the "disposition book," put down the names of materials and objects with the qualities on which their applications depend, *e. g.:*

LINEN, used for *towels,* because it is *soft, pliable, absorbent.*

LINEN, used for *thread,* because it is *soft, flexible, fibrous, tenacious.*

CORK, used for *stoppers,* because it is *soft, smooth, compressible, elastic,* and *tough.*

CORK, used for *life-preservers,* because it is *insoluble* and *light.*

GLASS, used for *window panes,* because it is *hard, insoluble, transparent,* and nearly *colorless.*

GLASS, used for *tumblers,* because it is *smooth, hard, insoluble.*

The pupils are also frequently exercised in giving connected descriptions of objects, orally and in writing, not merely the skeleton description, suggested in the previous sketch, but more or less complete descriptions, in which elegance and beauty of expression form an important element; descriptions which gradually bring the pupil to a consciousness that language may serve him not only the purpose of expressing his ideas clearly, but also of presenting them in a pleasing garb, in an impressive manner.

As types, we offer the following descriptions:

1. WATER.

Water is a colorless, transparent liquid; it mirrors the images of objects very clearly; it gives way to pressure very easily, like all other liquids, and has neither taste nor smell. All men and animals must die without this wholesome and refreshing drink. It is used in washing, dyeing, and in many other ways.

2. THE WRITING SLATE.

A writing slate is made of two parts—the slate and its frame. The slate, made of a rectangular plate of slate stone, is of a dark gray color, opaque, and slightly reflective; hard, smooth, and cold to the touch. It makes no impression on taste and smell, but is quite resonant. On account of its brittleness and the roughness of its edges, it is enclosed in a frame, made of four flat, oblong pieces of wood. These are grooved on the inner edge to hold the slate, and fastened together by means of mortices and tenons, and small wooden pegs.

3. A Cubical Block of Wood.

The piece of wood before me is called a cube, on account of its shape, having six equal square sides. The wood is of a yellow color, opaque, and polished, so as to make it reflective; it feels very smooth, quite hard, and is light enough to float on water. It is fibrous, porous, absorbent, and quite elastic. It is one of the most useful substances to man; because it is combustible, tough, durable, cheap, and easily worked.

4. A Tallow Candle.

A tallow candle is a long, slender, nearly cylindrical piece of tallow, with a cotton wick through its middle (in its axis). It tapers a little from the bottom to the top, and about one inch from the top, it becomes conical. The dingy white, translucent, and slightly odorous tallow is used to give light, because it is a cheap, fusible, and inflammable substance, burning with a clear, bright flame. The cotton wick is used, because it is fibrous, porous, and absorbent, to raise the melted tallow high enough to keep up the flame, and to prevent the too rapid melting of the candle.

Patience and judgment on the part of the teacher will accomplish a great deal in these exercises. The author has heard impromptu descriptions of objects from children nine or ten years old, far excelling in completeness, conciseness, and grace the imperfect types here presented.

All other written exercises resemble those sketched for the first half of this period, being only more extensive, to suit the advancement of the pupils. It is, therefore, unnecessary to offer additional types.

CHAPTER X.

GRAMMAR CONTINUED—THIRD PERIOD—COMPARISONS—SPECIAL FORMS OF EXPRESSION—COMPARISON OF ADJECTIVES—PASSIVE VOICE—TENSES—RELATIVE PRONOUNS—INTERROGATIVE PRONOUNS.

THE remarks that were made in introducing the second period will also apply respectively to the third period. While the pupils, during the two preceding periods, have had frequent opportunities to use their growing powers of comparison and generalization, particularly in the exercises on definition, it is during the third period that we begin to attend *specially* to the development and practice of these powers. At the same time the faculties of perception and conception are not neglected, but continue to be developed and vigorously exercised. While, therefore, we continue the exercises in definitions and descriptions, we begin to pay special and methodical attention to the comparison and classification of objects.

We first guide the pupils in simply discovering the *resemblances* and *differences* between objects. It matters little whether we begin with the resemblances or differences; although, as a general rule, it is better to begin with the latter, since they are more prominent, more conspicuous to the pupil, than the resemblances. Thus, selecting the *door* and the *window* for an example, we may develop the following answers:

Differences.—The door is in a division-wall, the window is in an outside wall. The door reaches the floor; the window reaches nearer the ceiling than the door. The greater part of the door is made of wood; the greater part of the window is made of glass. The door is made to let persons into and out of the room; the window to let light into the room, to air the room, etc.

Resemblances.—The door is a part of the house, and the window is a part of the house. Each is in a wall and in a wooden frame. Both are of a rectangular shape. Both are made partly of wood. Both are painted. Both can be opened and closed, etc.

In the same manner, the table and the desk, the slate pencil and the lead pencil, the stool and the chair, the ceiling and the floor, and many other objects may be compared.

The slate exercises may consist of detailed, as well as outline comparisons, according to the type just presented (the window and the door), or according to the following:

1. The Slate Pencil and the Lead Pencil.

The slate pencil and the lead pencil are used for writing and drawing. They are fit for this on account of their softness, leaving marks on slate, stone or paper over which they may be drawn. The lead pencil is made of two materials, plumbago and wood. The wood is needed to protect the plumbago, which is much softer and more brittle than soap-stone, the only material of which slate pencils are made. Both are long and slender cylinders, and for use, are cut or ground to a sharp point at one end. The marks left by lead pencils are black, while those made by slate pencils are white.

2. The Sewing Needle and the Pin.

The needle and the pin resemble each other in shape, both being conical, tapering to a sharp point. Both are smooth and hard to the touch, and both are metallic; but pins are made of brass or iron, whereas needles are made of steel. They differ, therefore, in many of their qualities, steel being harder, more elastic, more brittle, and less flexible than brass or iron, and of a different color. We also find in one end of the needle a small oval hole to receive the thread, but the upper end of the pin has a small flattened head, against which the finger can be pressed without danger.

3. Wine and Water.

These two liquids, used for drinking, differ in many qualities. Wine is semi-transparent, of different colors, usually red or yellow; water is always colorless and transparent. Wine has both flavor and odor, but water is tasteless and odorless. Wine is a vegetable, but water is a mineral substance. People may drink as much water as they please without getting drunk; but if they drink too much wine, they lose their senses and become intoxicated.

4. Wool and Cotton.

Both are white, fibrous, combustible.

Wool is heavier, tougher, more elastic, more durable than cotton. Cotton is more flexible, softer, and has longer and thinner fibers than wool.

5. Wood and Stone.

Resemblances.	*Differences.*
Both are *opaque*,	They differ in color.
porous,	Stone is *harder* than wood;
absorbent,	Stone is *heavier* than wood;
etc., etc.	Stone is *tasteless*, wood has a *flavor*;
	Stone is *inodorous*, wood is *odorous*;
	Stone is more *resonant* than wood;
	Stone is *granular*, wood is fibrous;
	Stone is *brittle*, wood is *tough*;
	Stone is less *elastic* than wood;
	Stone is *fusible*, wood is not;
	Stone is more *durable* than wood;
	Stone is *mineral*, wood *vegetable*;
	Wood is *combustible*, stone is not.

The reader will fail to find in these types the progressiveness which characterizes those given in previous chapters. Miscellaneous artificial objects and the substances of which they are composed, do not offer so favorable a material for exercises in comparison as natural objects. Hence we have put off the giving of progressive types for comparison for the chapters treating on natural objects. For the same reason, the further discussion of exercises on classification and generalization has been deferred.

In addition to the written exercises here indicated, we continue the exercises on special forms of expression, combining with those, sketched in previous chapters, others on comparison of adjectives, on the possessive and objective cases of personal pronouns, on the passive voice of verbs, on the imperfect tenses (present, past, and future) of the indicative mood, on relative and interrogative pronouns, and, perhaps, on some of the simple conjunctions—according to the following and similar formulas:

Comparison.

1. Wood is hard. Stone is harder than wood.
   Stone is hard. Steel is harder than stone.
2. Wood is hard. Stone is harder than wood.
   Steel is harder than stone. Steel is the hardest.
3. Wood is hard. Stone is harder than wood.
   Wood is less hard than stone.
4. Steel is hard. Stone is less hard than steel.
   Wood is less hard than stone.
   Wood is the least hard.
5. Wood is hard; stone is harder; steel is the hardest.
6. Steel is hard; stone is less hard; wood is the least hard.

7. Steel is brittle. China is more brittle.
Glass is the most brittle.

For the objective and possessive cases of personal pronouns, we refer to the formulas given for the objective and possessive cases of nouns (pp. 84, 85); and to exercises on prepositions (page 56). It will be well to exercise the pupils, as yet, only upon the adjective forms of the possessive case of personal pronouns.

Passive Voice.

8. The dog sees—what? The dog sees the rat.
The rat is seen—by what? The rat is seen by the dog.

Tenses.

9. To-day I write. Yesterday I wrote.
To-morrow I shall write.

10. Yesterday I wrote; to-day I write; to-morrow I shall write again.

11. I write; I wrote; I shall write.
He writes; he wrote; he will write.

12. I shall write; we shall write.

13. He will write; you will write; they will write.

14. $\left.\begin{array}{l}\text{I}\\ \text{We}\end{array}\right\}\text{shall write.}$

$\left.\begin{array}{c}\text{He, she, or it}\\ \text{You}\\ \text{They}\end{array}\right\}\text{will write.}$

15. Write, wrote, shall or will write.

Passive Voice and Tenses.

16. The dog sees the rat. The rat is seen by the dog.
    The dog saw the rat. The rat was seen by the dog.
    The dog will see the rat. The rat will be seen by the dog.

It is unnecessary as yet, nay, it would confuse the pupils, to practice the forms of the future, which require the auxiliary *shall* in the second and third persons, or the forms indicative of resolution instead of futurity ; since the child has rarely, if ever, an opportunity to use them or to hear them used.

Relative Pronouns.

17. A man, who writes, is a writer.
    A man, who makes shoes, is a shoemaker.
18. A thing, which breaks easily, is brittle.
    A thing, which can be burned, is combustible.
19. The man, who sees the dog, runs.
    The man, that sees the dog, runs.
20. The rat, which sees the dog, runs.
    The rat, that sees the dog, runs.
21. I see the man who runs from the dog.
    I hear the dog that barks at the man.

Interrogative Pronouns.

22. The man whips the dog. Who whips the dog?
23. The dog bites the man. What bites the man?
24. The man whips the dog. What does the man whip?
25. The dog bites the man. Whom does the dog bite?
26. The girl pets the cat. Who pets the cat? What does the girl pet?

CHAPTER XI.

GRAMMAR, CONCLUDED—SENTENCE—SUBJECT AND PREDICATE—TRANSITION.

During this period (about the fourth school year), the pupils may be gradually introduced into the conscious study of grammar in its narrow sense, as a *science.* But here we should be careful not to work on the old routine plan of school grammarians; we should still keep in view the principles of natural teaching, indicated above; we should still proceed from the known to the unknown, from the simple to the complex, from the whole to the parts, from the concrete to the abstract; we should still follow the method of combined analysis and synthesis—of combined discovery and application on the part of the pupil. We should not, therefore, pitch the pupils headlong into the confused maze of strange and terrible words, indicative of strange and terrible sciences, of parts of speech, properties of words, kinds of nouns, adjectives, etc.: but we should begin the study of grammar where Plato began it—*with the simple sentence, and its resolution into subject and predi-*

cate. The objects of this little book will permit us only to indicate how this may be accomplished.

The pupil is at first taught to recognize *the expression of a thought* as a *sentence.* The teacher may write upon the black-board the sentences—

The tree is beautiful.
The tree grows.—

and lead them to recognize these sentences as expressions of thoughts about the tree. He may then let them express orally, and write upon their slates other thoughts about a tree, as well as thoughts about other objects; and he may, ultimately, *tell* them that such an expression of thought is called a *sentence.* He may then practice them in the recognition and formation of sentences, in their distinction from words and phrases (parts of sentences or propositions), and in the definition of the term—*sentence.*

The teacher may then again write upon the black-board the sentences—

The tree is beautiful.
The tree grows.—

and ask questions like the following, to lead the child to the discovery that each sentence consists of two parts: What is beautiful? (*The tree* is beautiful.) What is the tree? (It *is beautiful.*) What grows? (*The tree* grows.) What does the tree do? (It *grows.*) What does the word *grows* tell? (It tells what the tree *does.*) What do the words *is beautiful* tell? (They tell what the tree *is.*) What do the words *the tree* tell, in the first sentence? (They tell us *what* is beautiful.) What do the words *the tree* tell, in the second sentence? (They tell us *what* grows.) Very few such exercises will enable the child to see clearly that every sentence has two parts—one part telling what the other is or does; to receive the terms *subject* and *predicate* for these parts respectively; and to form simple definitions of these terms, resembling perhaps the following: *The subject is that part of a sentence about which something is told. The predicate is that part of a sentence that tells something about the subject.*

Many sentences should now be analyzed and formed, orally and in writing, to practice these things. We may, for instance, take the sentence, *The dog barks,* and ask: What is the predicate? (*Barks* is the predicate.) Why? (Because it tells something about the subject, *the dog.*) What is the subject? (*The dog* is the subject.) Why? (Because something is told about it.)

Or a number of sentences may be written on the black-board, and each child may, in turn, simply name the subject or predicate of one of the sentences. Or the teacher may pronounce a sentence for each pupil in turn, or for the class collectively, and require them to name rapidly the subject or predicate. Thus:

Teacher.	*Pupil.*
The dog bites. Predicate?	Bites.
The man whips the dog. Predicate?	Whips the dog.
The good boy writes. Subject?	The good boy.
Does the lazy boy read? Subject?	The lazy boy.
The cat eats meat. Predicate?	Eats meat.
The large cat caught a rat. Subject?	The large cat.

Again, the teacher may cause each pupil, in turn, to rapidly complete a sentence, himself giving only the subject or predicate. Thus:

Teacher.	*Pupil.*	
Mews.	Predicate.	The cat mews.
Howl.	Predicate.	The dogs howl.
Birds.	Subject.	Birds sing.
The rose.	Subject.	The rose is red.

Again, we may dictate sentences to the pupils or let them form sentences themselves or let them copy a simple piece from the reader, and require them, in each case, to underscore the subjects or the predicates or both—the predicate with one and the subject with two lines.

As soon as the pupils have thoroughly mastered the distinction between the subject and predicate, we may proceed to develop definitions of nouns (names of things), pronouns (words standing for nouns), and verbs (words expressing a being or doing). When these ideas are fixed, together with perhaps some notions on number, we may consider the principal modifiers of nouns—adjectives (words telling what kind, how many, which one or which ones), nouns in the possessive case, adjuncts (phrases) formed with the preposition *of*, and relative clauses. Then we may take the principal modifiers of verbs—adverbs (words telling how, when, where, whither, etc.), adjuncts (phrases telling how, when, where, whither, etc.), nouns and pronouns in the objective case, depending on transitive verbs, and conjunctive adverbs in connection with corresponding subordinate clauses. Then may follow exercises upon the voices and tenses of verbs (confining ourselves, as much as possible, to the indicative mood) with some general practice on conjugation.

With these ideas well practiced, and clearly and thoroughly fixed, the pupil will be prepared to enter advantageously upon the synthetic study of grammar with any good text-book and with any good teacher who, instead of following the text-book blindly or indolently, is ever mindful of the great principles of natural teaching and gives full scope to his inventiveness, that most important of all mental qualifications to the teacher.

CHAPTER XII.

GEOMETRY—FIRST PERIOD—SEPARATE EXERCISES—ARTIFICIAL SYSTEMS — MEASURING—SELECTING SHAPES — DRAWING.

The sketches on the subject of geometry we divide again, for the sake of convenience, into three periods, corresponding with those adopted in presenting the subject of language. By geometry we mean the science of form, extent, and position; but we shall confine ourselves in our sketches to elementary geometry.

In the beginning of the first period, no separate exercises on this subject are needed, since general perceptions on form, extent, and position, are furnished in sufficient number and clearness by the exercises on miscellaneous objects, sketched in the first part of this work. Thus the sheet of paper (page 53) gave us an opportunity to develop perceptions of surface, face, edge, corner; the tin cup (page 55) perceptions of line, curved, straight, and of relations of position; the ribbon (page 57) perceptions of wavy, spiral, broad, narrow, long, short, etc. In the same manner other objects will furnish opportunities for developing additional perceptions of large, small, low, tall, thick, thin, deep, shallow, round, cornered; cube, sphere (ball), cylinder, square, circle, etc. We would particularly insist on the fact that *these ideas must be gained from the objects directly*—that the concrete must precede the abstract, and not (in the case of surfaces and lines) from imperfect and absolutely incorrect representations—drawings on the black-board or on cards. Such drawings will do very well, nay, they are needed to fix, review, or compare the impressions, but they should never be used in developing them. Thus the impressions square, circle, triangle, straight, curved, etc., must be developed with the assistance of objects presenting respectively thoso shapes in their surfaces or lines. Of course the clearness of the impressions in the mind of the pupil cannot be tested by his ability to give definitions, although many teachers are guilty of the absurd practice of teaching him, from the very beginning, to repeat, parrot-like, stereotyped phrases, which are to him nothing but sounds and which he recites sensationally, as a "learned pig" does its tricks.* That clearness can only be tested by the pupil's power to recognize and name the impressions readily and correctly, whenever they may be made; and, to some extent (as far as ideas of surfaces, lines, and angles are concerned), by the results of their efforts to represent them on the slate or black-board.

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* *Massachusetts Teacher*, vol. xix., page 16.

As soon as some general ideas are gained, separate exercises may be made, directing the pupil's attention specially to the observation of form, extent, and position. These exercises should consist principally in the *measuring* of objects—comparing them in their length, breadth, and thickness; in *selecting* pieces of tin and paste-board of various shapes from suitable collections; and in *drawing* lines and figures of various shapes. As much scope as possible should frequently be given, in all these exercises, to the fancy and desire for variety on the part of the pupil, in order to arouse and maintain his interest, practice his inventiveness, and to develop in him the discovery of the important postulate that figures may have any size or shape whatever.

The teacher should be very careful not to introduce the pupil too soon into a rigidly systematic study of geometrical facts—not to follow too soon the artificial systems of text-books. Many teachers are in the habit of making such exercises exclusively, before they begin with the so-called *object-lessons*, probably because they imagine such an arrangement to be more *systematical.* It is, however, a great error to pursue such a course, because it is *unnatural.* Man was led to the study of form, extent, and position, by the great variety of forms, etc., in the objects around him; and the child must be guided on the same road—"*the genesis of knowledge in the individual must follow the same course as the genesis of knowledge in the race*"*—the *concrete* must precede the *abstract*, the *known* the *unknown.* This is the *natural* system by which knowledge is acquired—this is "object-teaching;" and no other, no *artificial system* will produce the same happy results. Experience will prove to every teacher that, as far as he has recourse to artificial systems or expedients, he will lessen or even destroy the interest in the respective study on the part of the pupils; because their minds cease to be independently *active*, and become *passive recipients.* Object-teaching, especially during the earlier stages of the child's development, requires the teacher to be "systematically unsystematical"—"artificially natural," as it were, in all his methods. Hence, *objects* are presented to the pupil for study, until the variety of shape, extent, and position (and the same remark applies to color, number, etc.) has created in his mind a desire to study these separately. The pupil may be but vaguely conscious of this desire, yet the zeal which he manifests in drawing figures on his slate and in measuring objects that interest him, shows plainly that his mind is receiving palatable food. Should the teacher begin the separate exercises too soon, he will know it by the listlessness, the want of zeal, on the part of the pupil; he should then discontinue them and await a more favorable period—rarely later than the third month of the pupil's attendance at school.

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* Spencer, *on Education.*

At all times, these separate exercises should be made very cautiously, the teacher guarding constantly against rendering them too monotonous, too formal, too abstract. Step by step the pupil should be led to invent new expedients for determining extent, to discover new relations of position, and new forms; and, in no case, should he be made a mere imitator. The pupil should be taught to work alone, with as little showing as possible. For the sake of suggestion, we offer the following sketches:

The first exercises in *measuring* consist merely in applying certain objects to one another and determining which is longer, broader, thicker, etc. The pupil finds successively by actual measurement that the slate is *longer* than the slate pencil, that the reading card is *twice as long* as the slate (or twice the length of the slate), that the slate is twice as *broad* as the book, the book twice as *thick* as the slate, that the slate pencil is *half as long*, the book *half as broad* as the slate, etc. He may then be taught to measure dimensions by spans and, when he has found that the spans are not of equal length and unreliable, he may receive a neat stick of wood about six inches long* as a standard span. With this apparatus, he may measure the dimensions of objects, by dictation or at will, in various directions. Larger dimensions, such as those of the floor and greater distances, he may at first measure in *paces* and ultimately in *feet.* Spans may then be abandoned and the *foot* adopted as the unit, the fractions enabling the teacher to guide the pupil in the construction of a simple *foot-rule* and to introduce him into the measurement in *inches.*

The exercises in *selecting* various shapes from suitable collections are extremely useful for fixing ideas on shape and position, gained in the object lessons. Each pupil should be provided with a box containing such a collection, and pains should be taken to teach him to handle the contents carefully. The forms should consist of differently colored pieces of cardboard, neatly cut with a knife. They need not all be regular; indeed, there should be quite a number of irregular forms to lead the child to clear conceptions of *regular* and *irregular*. With this box before him, the pupil may be required to select and to arrange by dictation a certain number of pieces that show straight lines, curved lines; a given number of straight, a given number of curved lines; pieces that are square, circular (round), oval, triangular; pieces in the shape of a square, a circle, an oval, a triangle; pieces that show a given number of right, obtuse, and acute angles; pieces that show parallel, perpendicular, slanting lines, or a given number of sets of parallel or perpendicular lines; and so on in numberless combinations and variations which the ingenuity of the teacher will not fail to suggest.

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* The standard span of nine inches is, of course, too long for the child.

The exercises in *drawing* will be found the most difficult to handle, but also the most fertile in results. Too much liberty should not be given to the pupil's fancy, for fear of making the exercises mere play, unattended by systematic progress in developing fundamental ideas on shape and extent; too much restraint should not be applied, for fear of suppressing in the pupil that innate desire for invention and independent application of acquired skill and knowledge—a desire which it is the teacher's duty to foster and cultivate into a never-failing power. While, therefore, it would not be advisable to let the pupil draw nothing but grotesque representations of surrounding objects and rude creations of his own fancy, it would be equally unwise to force him from the beginning into rigid systems. From the first day at school, the child should often be encouraged in drawing on his slate anything he pleases, with a view, mainly, of accustoming him to the proper handling of the slate-pencil. No matter how whimsical the results may be, no matter even if the pupil sometimes only scratches up his slate in all directions: he learns to *handle* slate and slate-pencil. And, as he improves in skill, he begins to have better success in drawing his caricatures of boys, girls, cats, pigs, horses, trees, houses, pumps, etc., and to delight in more careful efforts. The teacher, too, has sometimes made correct drawings on the blackboard and on the pupil's slate, or he has, by means of a few lines, improved or assisted the pupil's attempts, until the latter has grown eager to rival his teacher's success, and anxious to follow his teacher's directions. In drawing the outlines of objects that interest the pupil, he will learn more of the art of drawing geometrical figures, than he could do if he were to begin his efforts with the representation of straight and curved lines, various kinds of angles, different surfaces, etc.: simply because he understands what he is doing and can himself judge the correctness of his work. The interest, which this ability naturally develops in him, causes him not only to apply himself with more zeal, but induces him also to observe objects more clearly and carefully, and to notice the shape, extent, and relative positions of their lines and surfaces more clearly.

In order to enable the pupil to derive adequate profit from the systematic drawing of lines, angles, and surfaces, in various positions, it is necessary to await a period, when he understands them sufficiently to feel an interest in them. The pupil may then be required to draw straight, curved, wavy, and spiral lines—from right to left, or vice versa; upwards or downwards, slanting to the right or left; parallel, spreading (diverging) lines—to the right, to the left, upwards, downwards, and (in the case of curved lines) curved upwards, downwards, to the right or left; right, obtuse, acute angles in various positions; triangles with one right angle, one obtuse angle, two acute angles, three acute angles; and, ultimately, even rectangles and squares, ovals and circles. Again, they may be required to draw lines of different lengths and angles of different divergences: *e. g.*, a given number of lines one inch long, or as long as a given line, then lines twice as long, half as long, etc.; or an acute angle similar to a given one, then one smaller, greater, twice as great, half as great, etc. Again, they may be required to draw, by dictation, simple outlines of objects—of a cup, a tumbler, a slate, a book, a house, a pump, a table-knife, a bucket, etc., according to the following type:

Draw, near the bottom of your slate, a straight line from left to right; from the right end of this line, draw a straight line upwards; make it a little shorter than the line at the bottom; from the left end of the bottom line, draw another straight line upwards; make it as long as the line on the right; draw a straight line across from the top of the line on the left to the top of the line on the right; from the top of the line on the left, draw a short straight line upwards, slanting to the right; from the top of the line on the right, draw a short straight line, slanting to the left; make this slanting line as long as the first; from the top of the slanting line on the left, draw a straight line across to the top of the slanting line on the right; now put the door, the windows, and the chimneys, where you think they belong. During these exercises, the teacher must constantly move about among the pupils, to assure himself that he is understood by them, to see that they put the pencils in the right places and that they draw the lines as directed.

CHAPTER XIII.

GEOMETRY, CONCLUDED—SECOND PERIOD—DEFINITIONS—SPECIAL EXERCISES—THIRD PERIOD—GENERIC DEFINITIONS—MEASURING — CUTTING OF SHAPES — TRANSITION.

In the second period, new ideas on shape and position (excepting the forms of solids) may be given the pupils without reference to objects, the teacher using as a means of illustration the black-board alone. Thus, in order to develop with the pupils the idea rhombus, it is not necessary to start with an object having rhombic faces: drawings on the black-board will be fully sufficient. The teacher may call one of the pupils to the black-board and ask him to draw a straight line; then, from the left end of this line, a second straight line, making a right angle with the first; then, from the right end of the first line, a third straight line, forming also a right angle with the first; then, to make the second and third lines equal in length to the first; then, to draw a fourth straight line connecting the free ends of the second and third lines. The pupils will now tell the teacher that the figure of a square has been drawn. Another pupil may then be called out and, on his part, be required to draw a straight line; then, from the right end of this line a second line, making an acute angle with the first and equal to the first; then, from the right end of the first line, a third straight line parallel to the second and equal to the first; then, a fourth line connecting the free ends of the second and third. The pupils may then be asked, if this second figure is also that of a square, in what respect it differs from the square, in what respect it resembles it, and, ultimately, they may receive the name *rhombus* for the figure. The idea and its name may then be fixed in various ways, by drawing, by selecting objects presenting rhombic faces, etc.

In this period, the pupils should also begin the formation of definitions, the teacher proceeding again with the same active patience on which the author has insisted before. These definitions need not be technical, but should always remain within the developing power of the pupil. We offer the following as types:

A *line* is the distance between two points.

A *face* is a part of a surface, bounded by lines (edges.)

A *square* is a face, bounded by four equal lines which make four right angles.

A *rhombus* is a surface (figure), bounded by four equal sides which do not form right angles, or which form two acute and two obtuse angles.

A *cube* is a solid, bounded by six equal square sides.

Difficult as it may seem to attain these definitions, they have been formed by pupils in this period, slowly, gradually, but clearly. It is true they passed through many transitions, before reaching even the above forms, but they reached them, nevertheless, through the independent efforts of the pupils. All the teacher needs is tact and skill in presenting the subject in an interesting and striking light and the *power of waiting.* Thus, the definition of the square passed through the following forms:

1. The square is a figure with four lines.
2. The square is a figure, bounded by four lines.
3. The square is a surface (figure), bounded by four equal lines.
4. The square is a surface, bounded by four equal lines and having four right angles.
5. The square is a surface, bounded by four equal lines which form four right angles.

Of these forms only 2 and 5 were *given* by the teacher, for the sake of greater elegance, the others were *found* by the pupils—found, of course, with the teacher's guidance. No. 3 was obtained from No. 2, by drawing rectangles and by exhibiting rectangles, the pupils being required to find and state the difference between them and the square. No. 4 was obtained from No. 3 in a similar way, by drawing rhombic figures and by exhibiting rhombic surfaces.

The definition of the cube was reached in a somewhat different manner. The first clear definition stood as follows: The cube is a solid with six faces, eight corners, twelve edges, and twenty-four angles. Here the attributes *equal* and *square* had to be added to the description of the sides; and it had to be proved that all the remainder (after the word *sides*) is superfluous. This was a severe exercise for the conceptive power of the pupils, but they ultimately triumphed and clearly discovered that it is impossible for a figure, bounded by six equal square sides, to have more or less than eight corners, twelve edges, and twenty-four angles.

The definitions developed during this period need, as yet, have no special reference to the classification of the various shapes; and little attention need be paid to the placing of a given shape under the *nearest genus.* Thus, we need not insist on defining the rhombus as an oblique-angled parallelogram, all the sides of which are equal; but we may be satisfied with any clear and unequivocal definition, whether it call the rhombus a surface, a polygon, or a four-sided figure. The chief concern in all definitions is, as yet, the *specific difference.*

The special exercises in *measuring* should be continued vigorously during the whole of this period, with a view, chiefly, of giving the pupils the valuable power of measuring distances by the eye alone. The exercises in *selecting* shapes may, however, be discontinued; and the *cutting* of given shapes from card-board substituted in their stead. Directions for these exercises may be given at school, and the pupil may be required to practice at home and to bring the results of his efforts to school for inspection. Much time is bestowed on *drawing*, on geometrical drawing as well as on the representation of actual objects. Still the precautions given in the previous chapter hold good: the pupil should never be forced to draw anything which he does not fully understand and in which he does not feel a lively interest. In the course of the period, he may be allowed to draw on paper, and in geometrical drawing, he may gradually be taught the use of the rule and of the dividers.

During the third period, new ideas are gained essentially in the same way as in the previous period with the difference, perhaps, that the developing lessons become more and more abstract, less and less connected with actual objects, as the pupils obtain clearer conceptions of shape, position, and extent. It is, therefore, useless to enlarge further on this part of the subject.

Much time should be devoted to *generic* definitions, to the classification of related shapes. Heretofore, the pupils are supposed to have defined the various shapes independently, without reference to allied figures: they formed only *specific* definitions. They must now compare the various shapes, arrange them in groups or genera, and form definitions of these genera. This is not an easy task, but it "pays well," by its strengthening influence upon the powers of conception and of comparison and generalization; and, in this respect, perhaps no exercise equals it in educational value. Thus the pupils should be led to recognize *acute* and *obtuse* angles as *oblique* angles. They should be assisted in comparing the square, the rectangle, the rhombus, the rhomboid, the trapezium, and the trapezoid, and in discovering that they are all four-sided figures, or *quadrilaterals;* in recognizing the square, the rectangle, the rhombus, and the rhomboid as quadrilaterals, of which the opposite sides are parallel, as *parallelograms;* and again in classing the square and rectangle as *right-angled parallelograms,* and the rhombus and rhomboid as *oblique-angled parallelograms.* They are guided in comparing the various prisms with each other and in developing the fact that they are all solids, with two equal parallel polygons for bases and with as many parallel parallelograms for their sides as there are sides to the bases.

As soon as a new generic definition has been developed, the reflective specific definitions should at once be remodelled accordingly. Thus the definition of the square (page 121) would successively pass through the following phases :

1. The *square* is a *quadrilateral* (or foursided figure), of which all the sides are equal and all the angels right, and of which the opposite sides are parallel.

2. The square is a *parallelogram*, of which all the sides are equal and all the angels right.

3. The *square* is a *right-angled parallelogram*, of which all the sides are equal.

After the nearest genus has been recognized and defined, the pupil should be accustomed to define the species always in that genus. Thus, after recognizing the square and rectangle as *right-angled parallelograms*, the pupil should never be permitted to define them simply as *parallelograms*, as *quadrilaterals*, as *polygons*, or as *surfaces*. In this way, alone, can precision of thought and expression be cultivated.

The special exercises in *measuring* are continued and extended, so as to include the measurement of surfaces and solids. This should, however, not be introduced with the statement of general rules and their subsequent illustrations and explanations; but, as heretofore, the pupil should find the rules himself. For the measurement of surfaces, he may be provided with a number of small pieces of thin card-board about half an inch square, and these he may apply to larger right-angled parallelograms, and determine how many of these smaller ones are necessary to cover the latter. Again, he may draw squares and rectangles on his slate, on the black-board, or on paper, subdivide them into small squares, and count the number he obtains. He will soon discover that, in a rectangle which is two inches long and one inch broad, there are two rows of four half-inch squares, or four rows of two half-inch squares, and that, in a square of which the side measures two inches, there are four rows of four half-inch squares. He may then, himself, develop the rule for the measurement of right-angled parallelograms and may be practiced in the application of this rule. Then he may be led to discover that the same rule applies to other parallelograms, by drawing rhomboidal figures on thin paste-board, by subdividing these into half-inch squares by means of lines and scissors; he will, then, find that the triangles and trapezoids obtained may be arranged so as to form four squares; and, on counting, that the same law applies to oblique angled parallelograms, which he has previously discovered for right-angled parallelograms. In a similar way, he may be guided in the discovery of rules for the measurement of triangles and other polygons. According to the same principles, too, the pupil should be introduced into the measurement of solids with the assistance of small cubical blocks with which square and rectangular prisms may be built. Some of these blocks may be cut obliquely in various proportions, so as to enable the pupil to build also other prisms and pyramids.

Drawing, too, is continued, and special attention paid to geometrical drawing, applying the facts and principles taught during this and previous periods. No other instrument should, however, be used as yet, except the rule and the dividers.

The transition to the study of geometry as a science is now made (about the sixth school year) and the pupils are ready to take up the subject "synthetically." But, even now, care should be taken not to make the study too abstract and, particularly, to save the pupil the mind-killing labor of learning theorems, problems, and their solutions by heart.

CHAPTER XIV.

NATURAL HISTORY — REASONS FOR CHOOSING IT—FIRST PERIOD — DESCRIPTIONS — TECHNICAL TERMS — SEPARATE EXERCISES—PHYSIOLOGY.

THE claims of the subject of Natural History, as an educational agent, are so little appreciated, that we feel compelled to apologize for choosing it as a type in our illustrations, and to state and substantiate the reasons which have induced us to choose it. In the first place, no other subject offers to the pupils so many interesting objects for observation—interesting, if we exclude minerals, on account of their variety and life. The child observes with delight the dog, the horse, the chicken, the bug, the worm, long before he deigns to look upon the articles of furniture in the house with any degree of attention; he greets with shouts of joy the daubed picture of an animal, while he turns away indifferently from the most beautiful landscape painting, which can win his attention only through its representations of living things. Subsequently trees begin to attract his attention by their "motion and music in the wind," and flowers by their brilliant colors. Artificial objects (articles of furniture, playthings, tools, etc.) and minerals will enlist his active attention only after he has commenced to perceive how necessary they are to his own well-being or to that of animals and plants, or when he has discovered how they can be moved or made to sound—how they can be made to imitate living things; and, in the direct proportion in which they are capable of reminding him of life, they are interesting to him. Thus, the looking-glass is dear to him, because it reflects his own life-like image; he loves the rattle, because he can shake it and make a noise with it; the whistle has no charm for him until he has heard it sound. This principle, which is based upon our instinctive love of life, holds good during the whole existence of every man that has been fortunate enough to enjoy a natural education. The same love of life that causes the little girl to prefer the doll to the picture-book, and the pet kitten to the doll; the same love of life that causes the little boy to prefer the china animals to the building blocks, and the favorite pup to the china animals: that same love of life causes the adult to seek relief from his toils in the contemplation of living nature. It is among animals and plants, then, that we must look for the objects that will most surely arouse and fetter the pupil's attention and that will offer the richest material for the exercise and development of the powers of observation.

Again, objects of nature are pre-eminently fitted for exercises in comparison and classification, on account of their infinite variety, as well as on account of the clearness with which they exhibit, in well defined, unequivocal groups, common properties and purposes; and certainly no other objects will be delineated in their outlines by the pupils with more pleasure and profit than plants and animals, so varied and beautiful in form, and so dear and suggestive to the pupil's fancy.

Another weighty reason for choosing Natural History was the hope of assisting in its introduction into our elementary and common schools. We are aware of the many formidable obstacles that meet the teacher on every side, not only in his efforts to introduce the study of Natural History, but in all his attempts to make use of more natural and rational methods. We have often felt, and we still feel, the oppressive influence of that popular nervousness, which cries for lightning progress in the so-called "practical" subjects, which smiles incredulously at the "cant" about thoroughness, and about development and cultivation of the mental powers, and which considers as lost all the time spent in walks or in the study of anything beyond "the three R's" and, perhaps, history and geography. We have too often observed the blighting and retarding effects of ignorance and bigotry upon schools that labor under the control of trustees who have no conception of the high destiny and of the noble duties of man, and of the exalted office of the school and who, in the majority of cases, consider money-making the chief purpose of life—a purpose, the accomplishment of which, as we all know, requires very little intelligence and virtue. We are aware that in large cities, the country is so far removed from the majority of children as to be almost inaccessible to them and that, therefore, direct intercourse with nature is well nigh impossible. We are aware that a very great number of silly mammas do all in their power to cultivate in their children, especially in their daughters, a kind of cowardice that causes the little ones to shrink from all contact with animals and a kind of fashionable horror against long walks and against garden mud. Nay, we are painfully conscious of the fact, that a considerable number of *so-called* teachers do all in their power to cater to these prejudices against the study of nature, to increase them, and to invent arguments in their favor, either for the purpose of securing patronage, or for the purpose of concealing their own ignorance and of avoiding work on their part. Nevertheless, it is the duty of every teacher to combat these prejudices; and the deep sense of this duty is one of the main reasons that have induced the author to choose Natural History as a means of illustrating the application of the principles of Object-teaching.

In our remarks, we shall confine ourselves to animals and plants, presenting the subject in the same order in which language and geometry have been presented. To avoid redundancy we shall, however, pass over the first two periods very rapidly and pay more special attention to the exercises in comparison and generalization, for which natural objects are so eminently fitted. We cannot deny the fact that the school relations at these early ages are more or less artificial: hence the school finds it so difficult to accomplish anything in the study of nature during the first period. No special exercises can, therefore, be made profitable until the pupil has acquired some skill in drawing and in the description of objects, or about the middle of the second period. For the development of general ideas on life and growth, on motion and sensation, the teacher is unfortunately compelled to rely more upon the circumstances that surround the pupil out of school, particularly, at home, or upon subsequent instruction. It is true, he may occasionally take a walk with the little ones (provided his school is in the country and not too full), or he may direct their attention to certain animals and plants by means of stories or pictures, or even by direct exhibition, or by means of exercises similar to those indicated on page 68; but all these things are as nothing, compared to the influence which the parents may exert in arousing the child's interest by means of daily walks and talks, by the rearing of domestic animals, by the cultivation of garden plots, etc. Hence, lessons in the school on dogs, cats, chickens, ducks, frogs, fishes, etc., on leaves, wood, bark, apples, apple-trees, roses, rose-bushes, etc., will not differ in their character from the lessons on miscellaneous objects sketched on pages 47–71; and thus it would be useless to offer additional types for their treatment.

In the descriptions of animals and plants, which the child is taught to make during the second period, the same principles apply that were given for the description of miscellaneous objects. In order to secure method and precision, it is again necessary to accustom the pupils to observe and describe objects in question in a certain order of detail to which they must adhere rigidly. We offer the following types:

THE DOG.

Size.—Varying.

Head.—Pyramidal; placed horizontally.

Skull.—Rounded; higher behind than before.

Snout.—Half the length of the head; narrow.

Ears.—Large, pendant (or, as the case may be, small, erect.)

Nose.—Very long; nostrils, cold, moist, rounded.

Eyes.—Almond-shaped; pupil, round.

Mouth.—Large; upper lip, overlapping the lower; lower lip, smaller, with a toothed margin.

Tongue.—Smooth, long, flat.

Teeth.—Twenty above, twenty-two below. (The teeth may be described.)

Neck.—Round, about as long as the head.

Trunk.—Rounded, very broad, and stout about the chest, thinner (contracted) just in front of the hind-legs, covered with hair, like the rest of the body.

Fore-legs.—Lower than the hind-legs; four toes.

Hind-legs.—Higher than the fore-legs; five toes.

Claws.—Stout; blunt; always protuding.

Tail.—Round; curved upwards and to the left.

Hair.—Generally coarse, stiff, and short.

Voice.—Barks, growls, yelps, howls.

Habits.—(Under this head various peculiarities may be enumerated, if possible, also in a certain order.)

THE CAT.

The cat grows to be from ten to fourteen inches long and about five inches high.

The *head* is round and provided with a short *snout.*

It has two short, erect *ears*, running into a point; a *nose*, projecting very little; and two round *eyes*, of which the *pupil* is oblong and placed vertically.

Its *mouth* is quite small, the *upper jaw* is longer than the *lower* and a little broader in front. The *tongue* is rough. The *teeth* are very sharp, 16 above and 14 below. On both sides of the mouth, there are long, stiff hairs or bristles.

The *trunk* of the cat is long and flexible, cylindrical in shape. On the *fore-feet* there are four toes, and on the *hind-feet* there are five toes. The *claws* are sharp, curved, and retractile. The *tail* is long and tapering. The *hair* is smooth and soft, and electrical. The cat mews, purs, cries, and spits.

The cat eats small animals, such as mice, rats, small birds, and even lizards. It dislikes water, but is very fond of milk. Because it catches mice and rats, it is a necessary domestic animal. It is very cleanly. Its skin is used as fur, and its guts are used for musical strings.

The Pigeon.

The pigeon is about twelve inches long and about six inches high. It is covered with feathers, all except the bill and the feet, which are bare. The color of the feathers is generally blue, except those of the head and tail, which are white. The back is dark blue and the wings are light blue. It has two kinds of feathers: the quill feathers, in the wings and in the tail, and the downy feathers, covering the rest of the body. The parts of its body are: 1, the *head;* 2, the *neck;* 3, the *trunk;* 4, the *limbs* (wings and legs); and 5, the *tail.*

The *head* is small and round and provided with a conical *bill,* inside of which we can see a small, pointed *tongue,* but no *teeth.* The *upper mandible* is larger and more arched than the lower, and laps over the *lower mandible.* Near the base (root) of the upper mandible there is a soft skin, in which there are two oval *nostrils.* The *ears* cannot be seen, because they are entirely in the head. Its two *eyes* are small, round, and very gentle; they are also very acute.

The *neck* is round, short, and very flexible. The *trunk* is in the shape of an egg. The sides are covered by the wings; on the breast and belly there is very soft down.

The *limbs* are of two kinds: *wings* and *legs*. The *wings* grow from the sides of the trunk and are very long. (Ten of the feathers are very long.) They reach nearly to the end of the tail. The *legs* are short, and covered with down, all except the *feet*. These have four *toes*—three forward and one backward—furnished with small, thin claws.

They eat grain, live in pairs, and are very cleanly.

FLAX (an Herb).

Root.—Fibrous (many thread-shaped roots).

Stem.—Erect, thin, from two to three feet high; the tough fibers of the bast (inner bark) are used as flax, to make linen, etc.

Leaves.—Small, alternate, lancet-shaped (lanceolate) pale green.

Flowers.—Numerous, blue, very small, regular—blooms in June and July.

Calyx.—Divided into five parts (sepals).

Corolla.—Consists of five small blue petals.

Stamens.—Five, united below into a ring.

Pistil.—One: *ovary*, containing a few (ten) seeds (ovules), in five apartments (cells); five *styles*, each with a *stigma*.

Seeds.—Brown, small; used to obtain linseed-oil. To this the pupil may add the manner in which it is planted, and various other facts, connected with the practical application of flax.

THE WHITE LILY.

The *root* of this herb consists of a great number of very short and thin fibers.

Besides the root, there is in the ground the *bulb* (root stalk), which is yellow, covered with loose, juicy scales, arranged like shingles.

The *stem* is from two to three feet high, round, erect.

The *leaves* are very numerous, scattered along the stem, and have parallel nerves.

It bears a few *flowers* on short stalks (pedicels).

Its *calyx* consists of six white sepals, united below, and bent back at the top.

It has no *corolla*.

In the calyx there are six *stamens*, shorter than the sepals, and united with them below.

The *pistil* consists of a rounded *ovary*, containing three cells in which there are many flat *ovules*. The *style* is long and slender, thickened above. The *stigma* is three-lobed.

The teacher will often be compelled to have recourse to technical terms, especially in the study of plants. These should, however, never be given before the pupil has a clear idea of the meaning conveyed by the term, on the principle that *ideas must precede names.* This may be accomplished in the manner previously indicated, or by means of circumlocution, previous translation of the term into English words with which the child is familiar. The pupil will then easily retain the new technical term as a more convenient carrier of the idea in question.

Additional illustrations might be offered, but those given are sufficient to show how the subject may be handled. The ingenuity of the teacher should, however, be untiring in devising variations from these types; laying successively more stress upon the structure, the habits, the uses of animals or plants, the parts of animals or plants, and their respective uses, and upon the probable reasons for peculiarities of structure. As helps, more or less necessary in these studies, we would recommend frequent walks with a view of observing animals and plants; skeletonizing animals and collecting specimens of plants; the keeping of pet animals and the cultivation of a small garden; and, for the boys, hunting and fishing. In the latter exercise, we should, however, carefully guard against that bloodthirsty cruelty that characterizes untutored juvenile hunters and that induces them to kill whatever comes in their way for the pleasure, simply, of killing. If a bird or other animal has been killed, it should be carefully examined, perhaps prepared for skeletonizing, and the boy should be taught to avoid shooting similar birds afterwards.

As an exercise of great educational value, the collection and nursing of caterpillars and of other larvæ should be encouraged. The caterpillars should be kept where they can obtain an abundant supply of light and air, and, in some cases, moist earth. If the plant, on the leaves of which the larva feeds, is not within easy reach, common lettuce will prove an acceptable substitute in the majority of cases. This exercise is especially useful in the development of ideas on growth. The child should, however, be taught to let the butterfly once formed and examined, enjoy its freedom, and not to impale it on a pin for the sake of idle curiosity or silly vanity.

Frequently, too, the pupil should be led to study the physiology of the animal and vegetable systems. The butcher's stall, the dissection of some smaller animals, and especially the chalk and black-board, will offer sufficient material to enable the pupil to understand and appreciate the beauties of digestion, circulation, respiration, etc. The teacher should however, guard against entering too deeply into intricate details, into hypothetical explanations, and into diffuse lecturing. As heretofore, he should confine himself as much as possible to facts which the pupil can develop and illustrate by his own powers and acquirements. As much as practicable, the study of the functions of the respective parts of the animal or plant should be combined with the study of the parts themselves: so that the pupil may learn to look upon every part of the living animal or plant as something living in itself and as something essential to the life of the whole. This will be found particularly easy in the study of plants which do not conceal their organs of life in a protecting envelop as animals do and which, at the same time, do not resist observation or suffer by it.

CHAPTER XV.

NATURAL HISTORY, CONTINUED—COMPARISON AND CLASSIFICATION.

As soon as the pupils have acquired some skill in the description of animals and plants and have formed somewhat complete conceptions of the more familiar ones (about the fourth school year), they may begin to compare and classify them. In the beginning, the pupils may be required to simply recite or write down the names of animals or plants that *have* or *have not* certain qualities. This is a fundamental exercise in which the children cannot be drilled too thoroughly. It will be advisable, too, to avoid, from the very start, classifications based upon *accidental* properties, such as color, size, etc., so that the pupils may be enabled to form clear and correct conceptions of classes, based upon *essential* properties alone. Thus, they may recite or write upon their slates the names of animals that are *carnivorous* and of others that are *not carnivorous*, as follows:

Carnivorous.	*Not Carnivorous.*
The dog,	The horse,
The cat,	The cow,
The weasel,	The sheep,
The fox,	The rabbit,
The lion,	The camel,
The bear,	The giraffe,
The shark,	The squirrel,
The whale,	The bee,
The snake,	The butterfly,
etc., etc.	etc., etc.

In a similar way they may be required to give the names of herbivorous animals, of warm-blooded animals, of animals that have skeletons of bone, of animals that fly, etc., with their respective opposites. Two or more qualities may then be combined, and the pupils asked to name animals that are carnivorous quadrupeds or carnivorous birds, ruminants, rodents, etc. The material offered by plants may be similarly treated, furnishing lists of plants that have a certain kind of leaves, flowers, fruits, roots, or stems; of plants that grow in certain localities, that are used for certain purposes, etc. The importance and educational value of these exercises cannot be overestimated. They form the very basis of all classification, since to *classify* is to determine whether a certain object or group of objects has or has not certain qualities; and, at the same time, they cause the pupil to review carefully knowledge previously acquired, thus rendering that knowledge more and more his property.

Alternating, more or less regularly, with these exercises, others may be made, in which the pupils compare certain animals or plants in sets, according to the following types :

1. Dog and Cat.

Resemblances.

Both are *domestic* animals.
Both are of a medium size.
Neck and body of both are *cylindrical*
Both have four feet—are *quadrupeds.*
They walk on their toes—are *digitigrade.*
Both can *walk, run, leap, swim,* etc.
The skins of both are covered with *hair.*
Both breathe by means of *lungs.*
Both feed on flesh—are *carnivorous.*
Both give birth to living young—are *mammals.*

Differences.

Dog.	Cat.
Size.—Varying considerably.	All grown, about the same.
Head.—Pyramidal.	Almost spherical.
Snout.—Very long.	Short.
Ears.—Large, pendant.	Small, erect.
Pupil of the Eye.—Round.	A mere slit.
Teeth.—Forty-two, longer than in the cat.	Thirty.
Senses.—Odor best developed.	Sight best developed.
Legs.—Legs longer than in the cat (in proportion to the body.)	Stouter than in the dog.
Claws.—Always protruding, cannot be moved without the toes, blunt, nearly straight.	May be drawn in and stretched forth (retractile), sharp, much curved.
Tail.—Curved upwards.	Not curved upwards.—Longer in proportion to the body.
Hair.—Yields no sparks, when rubbed.	Softer than in the dog; yields sparks when rubbed forward in the dark.

Dog.	Cat.
Voice. — Barks, growls, yelps, howls.	Mews, purs, cries, and spits.
Progression. — Cannot climb.	Can climb.
Defense.—Uses the teeth.	Uses the claws.

2. The Gooseberry and the Currant-bush.

Resemblances.

Both are bushes or *shrubs.*

The leaves consist of 3—5 lobes.

Both have very small green flowers, with five-toothed, bell-shaped calyx, five stamens, and one pistil, bearing two styles.

Both produce eatable berries.

Differences.

Gooseberry.	Currant.
Stem. — Provided with prickles, producing many branches.	Without prickles, producing few branches.
Leaves.—Lobes not subdivided.	Lobes subdivided, more pointed.

	GOOSEBERRY.	CURRANT.
Flower.	Peduncles, usually three-flowered. (The difference in shape of the various parts of the flower may be added here.)	Peduncles usually many-flowered.
Fruit.	Sometimes prickly, larger and paler than the currant.	Never prickly, small, and in clusters.

3. THE HORSE AND THE COW.

The horse and the cow are *domestic animals,* belonging to the class of *quadrupeds.* They resemble each other very much in general appearance; and both are covered with a *thick, hairy skin,* which is used for leather. Both can *walk, trot, run,* and, if necessary, *swim.* Both are *herbivorous.*

On the other hand, the horse is generally *larger* than the cow, and is used as a *beast* of *burden,* whereas the cow furnishes us with *milk, cheese, butter* and *meat.* The horse is *graceful* and *agile,* whereas the cow is *clumsy* and *awkward.* Besides, the *head* of the cow is shorter and thicker, furnished with larger *ears,* and with two *horns.* The *upper jaw* is without teeth in front, and the tearing or canine teeth are wanting. The *neck* of the horse is gracefully arched, and furnished with a *mane,* whereas the neck of the cow is almost straight and disfigured by a loose *dew-lap.* The whole body or *trunk* of the horse is more compact and rounded than that of the cow. There is also a marked difference between the *tails* of the two animals; that of the horse being covered with long, elastic hairs in its whole length, while that of the cow is covered with short hair. The *legs* of the horse are comparatively longer, and also rounder and more graceful than those of the cow. The horse has on each foot a round, horny *hoof;* the hoof of the cow is divided in the middle, hence we say that the cow is *cloven-footed* or *cloven-hoofed.* The *hair* of the cow is longer, and less smooth and shining than that of the horse. The cow is a *ruminating* animal, and has a much more complicated stomach than the horse. The horse *moves* much more rapidly than the cow. The horse *neighs,* whereas the cow *bellows.*

4. THE OX, THE SHEEP, AND THE GOAT.

The principal points of resemblance in these animals are:

1. They are all *herbivorous.*

2. They *ruminate*—chew the cud. They have four stomachs. At first the food is chewed hastily, and

swallowed into the first and largest stomach or *paunch*. From this it passes to the second stomach, the *honey-comb*, where it is softened and made into little balls or pellets. These are forced back into the mouth, where they are chewed a second time. The food is then passed directly to the third stomach, the *manyplies*, and from this to the fourth, the *true stomach*, where it is digested.

3. They have hollow *horns* for defense.

4. Their *eyes* are placed at the side of the head rather than in front, and the *pupils* are oval and placed sidewise (horizontally), not up and down (vertically), as in the cat.

5. They have no *front teeth* in the upper jaw; but, in their place, a hard *pad*.

6. The *ears* are placed far back and are very movable.

7. The *legs* and the neck are long.

8. The feet are furnished with two toes or claws, forming together a *cloven* hoof; and, behind the hoof, a little higher up, there are two small toes or *hind-claws*.

9. They are very useful *domestic* animals.

10. They are *timid* and quite *stupid*.

They differ from each other principally:

1. In *size;* the ox is much larger than the sheep and the goat.

2. In *covering;* the hair of the ox is short and straight, that of the goat long and straight, whereas the sheep is covered with wool.

3. In the *horns;* those of the ox are curved outward and upward; those of the sheep backward, and then spirally forward; those of the goat upward and backward. Besides, the horns of sheep and goats are wrinkled and angular, while those of the ox are smooth and round.

4. In the *muzzle;* that of the ox is broader and naked, whereas the narrower muzzles of the sheep and of the goat are hairy. The goat also has a beard under the chin.

5. In the *tail;* that of the ox is long and thin, that of the sheep long and thick, and that of the goat very short and erect.

6. In the *uses* made of them: the ox only is used as a beast of burden and of draught; the sheep is used principally for its wool, and the goat for its milk.

5. THE PIGEON FAMILY OF BIRDS.

There are many kinds of pigeons. Among them I can name the Domestic Pigeon, the Wild Pigeon or Passenger Pigeon, the Carrier Pigeon, the Crown Pigeon, the Turtle Dove, and the Carolina Dove.

They are all very timid and gentle birds. They have the bill shorter than the head; the upper half of the bill (the upper mandible) overlaps the lower on both sides, and its root (or base) is covered with a soft skin in which the nostrils are placed. Their plumage is not very bright, but glossy—generally white, bluish, greenish, gray or brown. They have from twelve to fourteen long tail-feathers. Their feet are short and thin; the toes are placed on the same level, three before and one behind, and armed with short, stout nails for scratching. They have a double craw and a very strong gizzard. They feed principally on grains. They live in pairs, and usually lay only two eggs for a brood. They feed the young with a sort of milk which they make in their own crops.

6. THE GNAWING QUADRUPEDS, OR RODENTS.

These animals receive their name from the fact that they are fitted for gnawing hard substances, such as wood, and nut-shells. They have in each jaw two long, sharp front teeth, shaped like chisels. The rear portion of these teeth is much sharper than the front portion, and wears away in gnawing, so as to keep the teeth always sharp. These teeth grow as fast as they wear away. Between these front teeth and the back teeth (or grinding teeth) there is an empty space in the place of the tearing teeth. These animals are mostly vegetable eaters, feeding principally on nuts, wood, and the bark of trees, though some, like the rats, eat also flesh. The squirrels, rats, and mice, the beavers, guinea-pigs, porcupines, hares, and rabbits, belong to the rodents. The hares and rabbits differ from all the other rodents in having four front teeth in the upper jaw.

CHAPTER XVI.

NATURAL HISTORY, CONCLUDED—CATALOGUES OF CLASSIFICATIONS—EXTENDED TO OTHER SUBJECTS—TECHNICAL TERMS—TRANSITION—EFFECTS ON MORALS—CONCLUSION.

To assist the pupil's memory, as well as to strengthen his powers of classification, he should also be taught to draw up suggestive catalogues of the classifications, at which he may from time to have arrived, according to the following types:

1. Birds of Prey.

$$\text{Birds of Prey.} \begin{cases} \text{diurnal,} \begin{cases} \text{feeding on living prey, Falcons.} \\ \text{feeding on carrion, Vultures.} \end{cases} \\ \text{nocturnal — Owls.} \end{cases}$$

2. Vertebrate Animals.

$$\overbrace{\overbrace{\text{Viviparous, (Mammals).} \quad \text{oviparous. (Birds).}}^{\text{Warm-blooded.}} \qquad \overbrace{\text{with lungs, (Reptiles).} \quad \text{with gills. (Fishes).}}^{\text{Cold-blooded.}}}$$

They may then read these catalogues in various ways. Thus, the first of these types may be read: "There are three classes of birds of prey—falcons, vultures, and owls. The falcons are diurnal birds of prey, feeding on living animals; the vultures are diurnal birds of prey, feeding on carrion; and the owls are nocturnal birds of prey." Or, "Birds of prey are either diurnal or nocturnal. The diurnal birds of prey either feed on living animals, and are called falcons; or they feed on carrion, and are called vultures. The nocturnal birds of prey are the owls."

Again, these catalogues will serve as guides in framing terse definitions. Thus the pupil, if asked to define mammals and birds, will readily answer, from the second type: "Mammals are viviparous, warm-blooded vertebrates. Birds are oviparous, warm-blooded vertebrates."

Labor bestowed upon this formulizing of knowledge always "pays well." It practices the pupil in the highest and most difficult functions of the mind and peculiarly enhances his interest in the respective subjects of study. At every new success in thus reducing knowledge to a simpler and more tangible form, in *thus compressing diffuse facts into a nutshell*, as it were, he feels that his memory has been relieved of a heavy burden, and shows his gratitude in redoubled efforts to achieve similar triumphs. Therefore, this formulizing of related facts or principles should be extended to all subjects capable of classifications. We cannot refrain from offering, for the sake of illustration, a few such formulas, that have been used in our experience with much advantage in grammar and geometry.

1. PERSON.

First person	denotes the person or thing	speaking.
Second person		addressed.
Third person		spoken of.

2. FORMATION OF THE POSSESSIVE IN NOUNS.

We add to the Nominative,

('s)	(')
1. in all singular nouns. 2. in plural nouns not ending in s.	in all plural nouns ending in s.

3. TENSES.

Time.	Action.	Name of Tense.
Present, . .	Imperfect,	Present (Imperfect).
	Perfect,	Present Perfect.
Past, ...	Imperfect,	Past (Imperfect).
	Perfect,	Past Perfect.
Future, . . .	Imperfect,	Future (Imperfect).
	Perfect,	Future Perfect.

4. USE OF SHALL AND WILL.

	Shall or Should.	Will or Would.
	First Person.	
1. Futurity.	Persons, same.	Persons, different.
2. Resolution.	Persons, different.	Persons, same,

The first three formulas explain themselves; for the better understanding of the last, we will give the reading of the first part. "*Shall* and *should* are used to express futurity, when the person or thing expecting and the one to whom the expectation refers, are the same; *will* and *would* when the persons or things are not the same. In the first person *shall* or *should* are always used.

5. QUADRILATERALS.

- Symmetrical (PARALLELOGRAMS).
  - Right-angled.
    - equilateral. SQUARE.
    - not equilateral. RECTANGLE.
  - Oblique-angled.
    - equilateral. RHOMBUS.
    - not equilateral. RHOMBOID.
- Unsymmetrical.
  - Two parallels. TRAPEZOID.
  - No parallels. TRAPEZIUM.

To return to the subject of Natural History, we would warn the teacher once more against the incautious or too liberal use of technical names, since, particularly in classification, there will be much occasion to use them. Wherever it is practicable, purely technical names should be avoided: thus, the terms cuneate, cordate, hastate, dentate, and similar ones may be exchanged for *wedge-shaped, heart-shaped, spear-shaped, toothed*, etc., without loss of terseness, and with great gain of clearness on the part of the pupils. Again, the pupil will, for a long time, prefer the terms four-footed animals to quadrupeds, Dog family to Canidæ, Deer family to Cervidæ, Rose family to Rosaceæ, Lily family to Liliaceæ, etc., because they are more significant to him. In these cases, however, the technical names have much practical value, on account of their shortness. They should, therefore, be substituted gradually and cautiously for their English translations; but this should never be done, until the teacher is fully satisfied that the pupil has the *idea* clearly.

It is obvious that, after a course in Natural History—similar to the one sketched above, and extending through a period of two to three years, during the most impressible age of the pupil—books on zoology and botany will present a very different face to the young student, than they do, when he is pitched headlong into a maze of un-intelligible technicalities, arbitrary systems, and mysterious symbols; and that these subjects will cease to be "dry studies," rendering nature almost repulsive to the pupil.

Unquestionably, too, the teacher may use these exercises as one of the principal levers in the education of delicate, moral sensibilities. Let the teacher in these lessons not forget that, as the immortal Milton sings:

> "By contemplation of created things,
> We may by steps ascend to God."

And let the pupil gradually be brought to a consciousness that, in studying Nature, he studies the work of the wisest and best of beings, *the Living Word of God*; let him be taught to discover, wherever he looks, His wisdom and goodness, that beautiful harmony, that wonderful adaptation of all things to the surroundings, that all-embracing love, that affection without bounds — placing into the smallest thing an exhaustless source of happiness and delight and life, even for the greatest, and making the greatest serve the wants and wishes of the least; impartially and equally distributing joy and sorrow, love and aversion;—let him become conscious of this, so that he may himself become wiser and better. Above all things, avoid that un-fortunate and fatal error of looking upon Nature as a soulless object, as a collection of simply *interesting* facts, which daily arise and pass away, but guide the pupil to find the "golden kernel in the silver shell"—the eternal truths revealed in Nature's facts. To a child thus taught, Nature will indeed be a "mother," a bountiful dispenser of the richest and purest blessings.

According to the principles, indicated in the foregoing sketches, all other subjects of instruction should be treated. Thus, the study of geography should be introduced with "object lessons" on the geographical facts peculiar to the country in the pupil's immediate vicinity; the study of history should be based upon familiar narrations of events in the pupil's immediate experience at home, at school, and during his rambles; and the study of arithmetic should be rendered intelligible and attractive by being connected with concrete facts within the grasp of the pupil's mind, and within the pale of his direct sensuous observation.

Only if such a system is followed consistently can we expect to develop in our schools well-balanced human beings, capable of all the happiness to which they are naturally entitled, and able to dispense the blessings which their fellows have a right to claim from them; in short, only if such a course is pursued, will the school be enabled to accomplish its purposes and to perform its duties.